| | UTILITY PATENT APPLICATION TRANSMITTAL (Large Entity) (Only for new nonprovisional applications under 37 CFR 1.53(b)) | Docket No. 5314.00 |
| | | Total Pages in this Submission **187** |

TO THE ASSISTANT COMMISSIONER FOR PATENTS
Box Patent Application
Washington, D.C. 20231

Transmitted herewith for filing under 35 U.S.C. 111(a) and 37 C.F.R. 1.53(b) is a new utility patent application for an invention entitled:

> **APPARATUS AND METHOD FOR PACKAGING PROGRAMS IN A TELEVISION PROGRAM DELIVERY SYSTEM**

and invented by:

> **HENDRICKS, John S. and BONNER, Alfred E.**

If a **CONTINUATION APPLICATION,** *check appropriate box and supply the requisite information:*

☒ **Continuation**   ☐ **Divisional**   ☐ **Continuation-in-part (CIP)**   of prior application No.: ___08/912,934___

Which is a:

☒ **Continuation**   ☐ **Divisional**   ☐ **Continuation-in-part (CIP)**   of prior application No.: ___08/160,282___

Which is a:

☐ **Continuation**   ☐ **Divisional**   ☒ **Continuation-in-part (CIP)**   of prior application No.: ___07/991,074___

Enclosed are:

Application Elements

1. ☒ Filing fee as calculated and transmitted as described below

2. ☒ Specification having ___99___ pages and including the following:

   a. ☒ Descriptive Title of the Invention

   b. ☒ Cross References to Related Applications *(if applicable)*

   c. ☐ Statement Regarding Federally-sponsored Research/Development *(if applicable)*

   d. ☐ Reference to Microfiche Appendix *(if applicable)*

   e. ☒ Background of the Invention

   f. ☒ Brief Summary of the Invention

   g. ☒ Brief Description of the Drawings *(if drawings filed)*

   h. ☒ Detailed Description

   i. ☒ Claim(s) as Classified Below

   j. ☒ Abstract of the Disclosure

P01ULRG/REV04

UTILITY PATENT APPLICATION TRANSMITTAL
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5314.00

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187

Application Elements (Continued)

3. ☒ Drawing(s) *(when necessary as prescribed by 35 USC 113)*

    a. ☒   Formal   Number of Sheets   __84__

    b. ☐   Informal   Number of Sheets   _____

4. ☒ Oath or Declaration

    a. ☐   Newly executed *(original or copy)*   ☐   Unexecuted

    b. ☒   Copy from a prior application (37 CFR 1.63(d)) *(for continuation/divisional application only)*

    c. ☐   With Power of Attorney   ☐   Without Power of Attorney

    d. ☐   *DELETION OF INVENTOR(S)*
        Signed statement attached deleting inventor(s) named in the prior application,
        see 37 C.F.R. 1.63(d)(2) and 1.33(b).

5. ☒ Incorporation By Reference *(usable if Box 4b is checked)*
    The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied under Box 4b, is considered as being part of the disclosure of the accompanying application and is hereby incorporated by reference therein.

6. ☐ Computer Program in Microfiche *(Appendix)*

7. ☐ Nucleotide and/or Amino Acid Sequence Submission *(if applicable, all must be included)*

    a. ☐   Paper Copy

    b. ☐   Computer Readable Copy *(identical to computer copy)*

    c. ☐   Statement Verifying Identical Paper and Computer Readable Copy

Accompanying Application Parts

8. ☐ Assignment Papers *(cover sheet & document(s))*

9. ☐ 37 CFR 3.73(B) Statement *(when there is an assignee)*

10. ☐ English Translation Document *(if applicable)*

11. ☐ Information Disclosure Statement/PTO-1449   ☐ Copies of IDS Citations

12. ☐ Preliminary Amendment

13. ☐ Acknowledgment postcard

14. ☐ Certificate of Mailing

       ☐   First Class   ☐   Express Mail *(Specify Label No.):* _____

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UTILITY PATENT APPLICATION TRANSMITTAL
(Large Entity)
(Only for new nonprovisional applications under 37 CFR 1.53(b))

Docket No. 5314.00
Total Pages in this Submission **187**

Accompanying Application Parts (Continued)

15. ☐ Certified Copy of Priority Document(s) *(if foreign priority is claimed)*

16. ☐ Additional Enclosures *(please identify below):*

Fee Calculation and Transmittal

CLAIMS AS FILED

For	#Filed	#Allowed	#Extra	Rate	Fee
Total Claims	55	- 20 =	35	x $18.00	$630.00
Indep. Claims	4	- 3 =	1	x $78.00	$78.00
Multiple Dependent Claims (check if applicable) ☐					$0.00
				BASIC FEE	$690.00
OTHER FEE *(specify purpose)*					$0.00
				TOTAL FILING FEE	$1,398.00

☒ A check in the amount of **$1,398.00** to cover the filing fee is enclosed.

☒ The Commissioner is hereby authorized to charge and credit Deposit Account No. **04-1425** as described below. A duplicate copy of this sheet is enclosed.

  ☐ Charge the amount of _____ as filing fee.

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  ☒ Charge any additional filing fees required under 37 C.F.R. 1.16 and 1.17.

  ☐ Charge the issue fee set in 37 C.F.R. 1.18 at the mailing of the Notice of Allowance, pursuant to 37 C.F.R. 1.311(b).
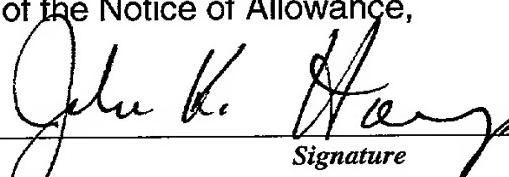
_____
Signature

John K. Harrop, Reg. No. 41,817
DORSEY & WHITNEY llp
1001 Pennsylvania Avenue, N.W.
Suite 300 South
Washington, D.C. 20004
(202) 824-8821

Dated: June 19, 2000

cc:

P01ULRG/REV04

APPARATUS AND METHOD FOR PACKAGING PROGRAMS IN A TELEVISION PROGRAM DELIVERY SYSTEM

Related Applications

This application is a continuation of co-pending U.S. Patent Application Serial Number 08/912,934, dated August 15, 1997, entitled AN OPERATIONS CENTER FOR A TELEVISION PROGRAM PACKAGING AND DELIVERY SYSTEM, which is a continuation of U.S. Patent Application Serial Number 08/160,282, now U.S. Patent Number 5,659,350 entitled AN OPERATIONS CENTER FOR A TELEVISION PROGRAM PACKAGING AND DELIVERY SYSTEM, which is a continuation-in-part of co-pending U.S. Patent Application Serial Number 07/991,074, filed December 9, 1992, entitled REMOTE CONTROL FOR MENU DRIVEN SUBSCRIBER ACCESS TO TELEVISION PROGRAMMING. These patents and patent applications are hereby incorporated by reference. The following other U.S. patents are also hereby incorporated by reference: U.S. Patent No. 5,798,785, dated August 25, 1998, entitled TERMINAL FOR SUGGESTING PROGRAMS OFFERED ON A TELEVISION PROGRAM DELIVERY SYSTEM; U.S. Patent No. 5,600,364, dated February 4, 1997, entitled NETWORK CONTROLLER FOR CABLE TELEVISION DELIVERY SYSTEMS; U.S. Patent No. 5,600,573, dated February 4, 1997, entitled AN OPERATIONS CENTER WITH VIDEO STORAGE FOR A TELEVISION PROGRAM PACKAGING AND DELIVERY SYSTEM, U.S. Patent No. 5,734,853, dated March 31, 1998, entitled SET TOP TERMINAL FOR CABLE TELEVISION DELIVERY SYSTEM, U.S. Patent No. 5,659,350, dated August 19, 1997. entitled AN OPERATIONS CENTER FOR A TELEVISION PROGRAM PACKAGING AND DELIVERY SYSTEM; U.S. Patent No. 5,682,195, dated October 28, 1997, entitled DIGITAL CABLE HEADEND FOR CABLE TELEVISION DELIVERY SYSTEM; U.S. Patent No. 5,559,549, dated September 24, 1996, entitled TELEVISION PROGRAM DELIVERY SYSTEM; U.S. Patent No. 6,052,554, dated March 18, 2000, entitled DIGITAL PROGRAM SYSTEM; and U.S. Patent No. 5,986,690, dated November 16, 1999, entitled ELECTRONIC BOOK SELECTION AND DELIVERY SYSTEM.

1   **Technical Field**

2   The invention relates to television entertainment delivery systems that provide television

3   programming to consumer homes. More particularly, the invention relates to an Operations

4   Center that organizes and packages cable television programming for delivery to consumer

5   homes.

6   **Background**

7   Advances in television entertainment have been primarily driven by breakthroughs in

8   technology. In 1939, advances on Vladmir Zworykin's picture tube provided the stimulus for

9   NBC to begin its first regular broadcasts. In 1975, advances in satellite technology provided

10   consumers with increased programming to homes.

11   Many of these technology breakthroughs have produced inconvenient systems for

12   consumers. One example is the ubiquitous three remote control home, having a separate and

13   unique remote control for the TV, cable box and VCR. More recently, technology has

14   provided cable users with 100 channels of programming. This increased program capacity is

15   beyond the ability of many consumers to use effectively. No method of managing the program

16   choices has been provided to consumers.

17   Consumers are demanding that future advances in television entertainment, particularly

18   programs and program choices, be presented to the consumer in a user friendly manner.

19   Consumer preferences, instead of technological breakthroughs, will drive the television

20   entertainment market for at least the next 20 years. As computer vendors have experienced

21   a switch from marketing new technology in computer hardware to marketing better useability,

22   interfaces and service, the television entertainment industry will also experience a switch from

23   new technology driving the market to consumer useability driving the market.

24   In order for new television entertainment products to be successful, the products must

25   satisfy consumer demands. TV consumers wish to go from limited viewing choices to a variety

26   of choices, from no control of programming to complete control. Consumers do not wish to

1   pay for one hundred channels when due to lack of programming information, they seldom, if

2   ever, watch programming on many of these channels.

3   The concepts of interactive television, high definition television and 300-500 channel

4   cable systems in consumer homes will not sell if they are not packaged, delivered and presented

5   in a useable fashion to consumers. The problem is that TV programming is not being managed,

6   packaged, delivered, and presented to consumers in a user friendly manner.

7   Consumers are already being bombarded with programming options, numerous "free"

8   cable channels, subscription cable channels and pay-per-view choices. Any further increase

9   in TV entertainment choices will likely bewilder viewers with a mind-numbing array of choices.

10   The TV industry has traditionally marketed and sold its programs to consumers in bulk,

11   such as continuous feed broadcast and long-term subscriptions to movie channels. The TV

12   industry is unable to sell its programming in large quantities on a per unit basis, such as the

13   ordering of one program.

14   In today's television world networks manage the program lineup for individual channels.

15   Each network analyzes ratings for television shows and determines the appropriate schedule

16   or program lineup to gain market share and revenue from advertising. Since each channel is

17   in competition with every other channel, there is no coordinated effort to organize television

18   programming in a manner that primarily suits the viewers.

19   Additionally, viewership fragmentation, which has already begun to decrease a

20   channel's or program's market share, will increase. Programming not presented in a user

21   friendly manner will suffer with a decrease in viewership and revenue.

22   And finally, with the imminent introduction of digital television technology, current

23   television delivery systems do not have the capabilities or features necessary to operate in the

24   digital environment.

25   **Summary**

26   This invention is a center for controlling the operations of a digital television program

27   delivery system. Specifically, the present invention is an Operations Center that allows for the

1   organizing and packaging of television programs for transmission in a television delivery system.

2   The Operations Center is the nerve center of the television program delivery system.

3   It receives data on viewership behavior and utilizes the data to assist in packaging programs

4   for future viewing. The Operations Center is a particularly useful invention for television

5   delivery systems which will provide users with the ability to select programs from on-screen

6   menus.

7   The Operations Center's primary component is a computer assisted packaging system

8   (CAP), which makes use of the necessary hardware and software to control and transmit

9   programming signals over a television delivery system. This computer assisted packaging

10   system creates the program lineup or packaging of programs and the packaging of menu and

11   control information for later transmission and use in the cable television systems. The CAP can

12   be specially designed to generate graphical menu displays for user selection of programs. The

13   hardware and software for controlling and transmitting programming signals over the television

14   delivery system is particularly useful in large television delivery systems which include satellite

15   transmissions to cable headends.

16   The software of the CAP performs the functions of gathering analog (and/or digital)

17   program signals from a variety of sources such as broadcast television, premium channels, and

18   video disk. The software also packages the programs efficiently for the available bandwidth

19   and for subscriber viewing through computer assisted creation of program line-up and allocating

20   of bandwidth. The line-ups are created to effectively group programming for display in menus

21   by categories. The television programs are packaged with the program control information

22   (such as cost for viewing certain program) and menu information.

23   The Operations Center of the present invention provides a method for remote

24   management and control of local cable and CATV programs available and on-screen menu

25   displays shown to subscribers. The Operations Center's computer software programs and

26   hardware provide "real-time" control over cable and CATV systems. By transmitting

27   appropriate control information the Operations Center has the ability to change allocation of

1   programs across physical channels, update menu information (from the Operations Center

2   location), reprogram menu formats and menu flow, and change or augment a packaged

3   program signal sent to a particular region of the country. The Operations Center is able to

4   control remotely certain features and software of the set top terminals and if necessary

5   reprogram menu display software stored at the set top terminals.

6   In order to properly manage program lineups, the Operations Center acquires viewer

7   information on programs watched. Such viewer information includes information about the buy

8   rates of specific shows, viewer preferences for programming, and the like, gathered by

9   recording viewer transactions. A compilation of viewer information data is needed in order to

10   make decisions on future individualized program lineup and program packaging. In addition,

11   allocation of menu space and construction of menus is aided by the use of viewer information

12   data. This information is received from the set top terminals using a feedback loop, usually

13   through the cable headends.

14   The present invention is not only able to operate in the digital environment but

15   introduces many new features to television program delivery.

16   **Description Of The Drawings**

17   Figure 1 is a diagram of the primary components of the television delivery system.

18   Figure 2 is an overview of the television delivery system operations.

19   Figure 3 is a schematic of the operation of the primary components of the system.

20   Figure 4 is a schematic of the primary components of the Computer Assisted

21   Packaging System (CAP).

22   Figure 5 is a more detailed schematic of the hardware of the Operations Center and

23   CAP.

24   Figure 6a is a chart of the program control information carried by the program control

25   information signal.

26   Figure 6b shows a bit-wise data format for program control information.

1   Figure 7 is a block diagram showing a Delivery Control Processor Unit and a

2   Computer Assisted Packaging Apparatus.

3   Figure 8 is a schematic of the subroutines for the CAP software.

4   Figure 9 is a software flowchart representing CAP operations.

5   Figure 10 is a diagram of the database structure for the databases supporting the

6   operations of the CAP.

7   Figure 11 is a block diagram of the Operations Center and Master Control Site.

8   Figure 12 is a block diagram of the computer assisted packaging shown in figure 11.

9   Figure 13 is a flow chart of the processing occurring at the Operations Center.

10   Figure 14 is a diagram of the bandwidth allocation for a 750 MHz system.

11   Figure 15 is a diagram/chart of the compressed channel allocation for the system.

12   Figure 16 is a diagram showing how three cable television systems each with a different

13   bandwidth may use the program delivery system and operations center of the present invention

14   simultaneously.

15   Figure 17 is a diagram showing three different cable headend systems, each system

16   receiving the entire satellite signal and stripping those parts of the signal which cannot be

17   handled by the local cable system.

18   Figure 18 is a diagram showing dynamic change in bandwidth allocation from a typical

19   week day prime time program signal to a Saturday afternoon program signal.

20   Figure 19 is a drawing of a broadcast television menu screen to be displayed on a set

21   top terminal.

22   Figure 20 is a drawing of a hit movie menu screen to be displayed on a set top terminal.

23   Figure 21 is a drawing of a hit movie description menu screen to be displayed on a set

24   top terminal.

25   Figure 22 is a flow chart of the progression of primary menus in the menu driven system

26   of the set top terminal.

1   Figure 23a is a drawing of the basic menus used in the present invention, including the

2   ten major menus represented by icons.

3   Figure 23b is a drawing of the basic menus used in the present invention, in addition to

4   Figure 23a.

5   Figures 24a, 24b and 24c are drawings of introductory menus.

6   Figures 25a, 25b, 25c and 25d are drawings of home menus.

7   Figure 26 is a drawing of an alternative of a home menu.

8   Figures 27a, 27b, 27c, 27d, 27e, 27f and 27g are drawings of major menus.

9   Figures 28a and 28b are drawings of hit movie description menus.

10 Figures 29a and 29b are drawings of hit movie notification submenus.

11 Figure 30a is a drawing of a hit movie escape during program menu.

12 Figure 30b is a drawing of a hit movie during program hidden menu.

13 Figure 30c is a drawing of a hit movie re-entry submenu.

14 Figures 31a and 31b are drawings of menus related to high definition television

15 programming.

16 Figures 32a, 32b, 32c, 32d, 32e and 32f are drawings of menus related to program

17 guide services.

18 Figures 32g and 32h are drawings of broadcast television menus.

19 Figures 32i, 32j and 32k are drawings of mood question menus.

20 Figures 33a, 33b, and 33c are drawings of interactive television promotional menus,

21 for Levels A-C.

22 Figures 33d, 33e, 33f, 33g, 33h, 33i and 33j are drawings of submenus for interactive

23 television services, Level A.

24 Figures 34a, 34b, 34c, 34d, 34e, 34f, 34g, 34h, 34i, 34j, 34k and 34l are drawings

25 of interactive services, Level B, particularly related to on-screen airline reservations.

26 Figures 35a, 35b, 35c, 35d and 35e are drawings of menus for digital audio services.

27 Figures 36a, 36b,37a and 37b are drawings of monthly account menus.

1 **Detailed Description**

2   A.   <u>Television Program Delivery System Description</u>

3   1.   <u>Introduction</u>

4   Figure 1 shows the present invention as part of an expanded cable television program

5 delivery system 200 that dramatically increases programming capacity using compressed

6 transmission of television program signals. Developments in digital bandwidth compression

7 technology now allow much greater throughput of television program signals over existing or

8 slightly modified transmission media. The program delivery system 200 shown provides

9 subscribers with a user friendly interface to operate and exploit a six-fold or more increase in

10 current program delivery capability.

11   Subscribers are able to access an expanded television program package and view

12 selected programs through a menu-driven access scheme that allows each subscriber to select

13 individual programs by sequencing a series of menus. The menus are sequenced by the

14 subscriber using simple alpha-numeric and iconic character access or moving a cursor or

15 highlight bar on the TV screen to access desired programs by simply pressing a single button,

16 rather than recalling from memory and pressing the actual two or more digit numeric number

17 assigned to a selection. Thus, with the press of a single button, the subscriber can advance

18 from one menu to the next. In this fashion, the subscriber can sequence the menus and select

19 a program from any given menu. The programs are grouped by category so that similar

20 program offerings are found on the same menu.

21   2.   <u>Major System Components</u>

22   In its most basic form, the system uses a program delivery system 200 in conjunction

23 with a conventional concatenated cable television system 210. The program delivery system

24 200 generally includes (i) at least one operations center 202, where program packaging and

25 control information are created and then assembled in the form of digital data, (ii) a digital

26 compression system, where the digital data is compressed, combined/multiplexed, encoded,

27 and mapped into digital signals for satellite transmission to the cable headend 208, and (iii) a

1   set of in-home decompressors. The program delivery system 200 transports the digital signals

2   to the cable headend 208 where the signals are transmitted through a concatenated cable

3   television system 210. Within the cable headend 208, the received signals may be decoded,

4   demultiplexed, managed by a local central distribution and switching mechanism, combined and

5   then transmitted to the set top terminal 220 located in each subscriber's home over the cable

6   system 210. Although concatenated cable systems 210 are the most prevalent transmission

7   media to the home, telephone lines, cellular networks, fiberoptics, Personal Communication

8   Networks and similar technology for transmitting to the home can be used interchangeably with

9   this program delivery system 200.

10 The delivery system 200 has a reception region 207 with an in-home decompression

11 capability. This capability is performed by a decompressor housed within a set top terminal

12 220 in each subscriber's home. The decompressor remains transparent from the subscriber's

13 point of view and allows any of the compressed signals to be demultiplexed and individually

14 extracted from the composite data stream and then individually decompressed upon selection

15 by the subscriber. The decompressed video signals are converted into analog signals for

16 television display. Such analog signals include NTSC formatted signals for use by a standard

17 television. Control signals are likewise extracted and decompressed and then either executed

18 immediately or placed in local storage such as a RAM. Multiple sets of decompression

19 hardware may be used to decompress video and control signals. The set top terminal 220 may

20 then overlay or combine different signals to form the desired display on the subscriber's

21 television. Graphics on video or picture-on-picture are examples of such a display.

22 Although a single digital compression standard (e.g., MPEG) may be used for both the

23 program delivery system 200 and the concatenated cable system 210, the compression

24 technique used may differ between the two systems. When the compression standards differ

25 between the two media, the signals received by the cable headend 208 must be decompressed

26 before transmission from the headend 208 to the set top terminals 220. Subsequently, the

1   cable headend 208 must recompress and transmit the signals to the set top terminal 220, which

2   would then decompress the signals using a specific decompression algorithm.

3   The video signals and program control signals received by the set top terminal 220

4   correspond to specific television programs and menu selections that each subscriber may

5   access through a subscriber interface. The subscriber interface is a device with buttons located

6   on the set top terminal 220 or on a portable remote control 900. In the preferred system

7   embodiment, the subscriber interface is a combined alpha-character, numeric and iconic remote

8   control device 900, which provides direct or menu-driven program access. The preferred

9   subscriber interface also contains cursor movement and go buttons as well as alpha, numeric

10   and iconic buttons. This subscriber interface and menu arrangement enables the subscriber to

11   sequence through menus by choosing from among several menu options that are displayed on

12   the television screen. In addition, a user may bypass several menu screens and immediately

13   choose a program by selecting the appropriate alpha-character, numeric or iconic combinations

14   on the subscriber interface. In the preferred embodiment, the set top terminal 220 generates

15   the menus that are displayed on the television by creating arrays of particular menu templates,

16   and the set top terminal 220 displays a specific menu or submenu option for each available

17   video signal.

18   3.   <u>Operations Center and Digital Compression System</u>

19   The operations center 202 performs two primary services, packaging television

20   programs and generating the program control information signal. At the operations center 202,

21   television programs are received from external program sources in both analog and digital form.

22   Figure 2 shows an embodiment of the operations center receiving signals from various external

23   sources 212. Examples of the external program sources are sporting events, children's

24   programs, specialty channels, news or any other program source that can provide audio or

25   visual signals. Once the programs are received from the external program sources, the

26   operations center 202 digitizes (and preferably compresses) any program signals received in

27   analog form. The operations center 202 may also maintain an internal storage of programs.

1   The internally stored programs may be in analog or digital form and stored on permanent or

2   volatile memory sources, including magnetic tape or RAM. Subsequent to receiving

3   programming, the operations center 202 packages the programs into the groups and categories

4   which provide the optimal marketing of the programs to subscribers. For example, the

5   operations center 202 may package the same programs into different categories and menus for

6   weekday, prime-time viewing and Saturday afternoon viewing. Also, the operations center 202

7   packages the television programs in a manner that enables both the various menus to easily

8   represent the programs and the subscribers to easily access the programs through the menus.

9   The packaging of the digital signals is typically performed at the operations center 202

10   by computer assisted packaging equipment (CAP). The CAP system normally includes at least

11   one computer monitor, keyboard, mouse, and standard video editing equipment. A

12   programmer packages the signals by entering certain information into the CAP. This

13   information includes the date, time slot, and program category of the various programs. The

14   programmer and the CAP utilize demographic data and ratings in performing the packaging

15   tasks. After the programmer selects the various programs from a pool of available programs

16   and inputs the requisite information, the programmer, with assistance from the CAP, can select

17   the price and allocate transponder space for the various programs. After the process is

18   complete, the CAP displays draft menus or program schedules that correspond to the entries

19   of the programmer. The CAP may also graphically display allocation of transponder space.

20   The programmer may edit the menus and transponder allocation several times until satisfied with

21   the programming schedule. During the editing, the programmer may direct the exact location

22   of any program name on a menu with simple commands to the CAP.

23   The packaging process also accounts for any groupings by satellite transponder which

24   are necessary. The operations center 202 may send different groups of programs to different

25   cable headends 208 and/or set top terminals 220. One way the operations center 202 may

26   accomplish this task is to send different program packages to each transponder. Each

27   transponder, or set of transponders, then relays a specific program package to specific cable

-11-

1   headends 208 and/or set top terminals 220. The allocation of transponder space is an

2   important task performed by the operations center 202.

3   The operations center 202 may also "insert" directions for filling local available program

4   time in the packaged signal to enable local cable and television companies to fill the program

5   time with local advertising and/or local programming. Consequently, the local cable headends

6   208 are not constrained to show only programs transmitted from the operations center 202.

7   New set top converters will incorporate both digital and analog channels. Therefore, the cable

8   headend 208 may combine analog signals with the digital signals prior to transmitting the

9   program signals to the set top terminals 220.

10   After the CAP packages the programs, it creates a program control information signal

11   to be delivered with the program package to the cable headend 208 and/or set top terminal

12   220. The program control information signal contains a description of the contents of the

13   program package, commands to be sent to the cable headend 208 and/or set top terminal 220,

14   and other information relevant to the signal transmission.

15   In addition to packaging the signal, the operations center 202 employs digital

16   compression techniques to increase existing satellite transponder capacity by at least a 4:1 ratio,

17   resulting in a four-fold increase in program delivery capability. A number of digital compression

18   algorithms currently exist which can achieve the resultant increase in capacity and improved

19   signal quality desired for the system. The algorithms generally use one or more of three basic

20   digital compression techniques: (1) within-frame (intraframe) compression, (2) frame-to-frame

21   (interframe) compression, and (3) within carrier compression. Specifically, in the preferred

22   embodiment, the MPEG 2 compression method is used. After digital compression, the signals

23   are combined (multiplexed) and encoded. The combined signal is subsequently transmitted to

24   various uplink sites 204.

25   There may be a single uplink site 204 or multiple uplink sites (represented by 204',

26   shown in phantom in Figure 1) for each operation center 202. The uplink sites 204 may either

27   be located in the same geographical place or may be located remotely from the operations

1   center 202. Once the composite signal is transmitted to the uplink sites 204, the signal may be

2   multiplexed with other signals, modulated, upconverted and amplified for transmission over

3   satellite. Multiple cable headends 208 may receive such transmissions.

4   In addition to multiple uplinks, the delivery system 200 may also contain multiple

5   operations centers. The preferred method for using multiple operations centers is to designate

6   one of the operations centers as a master operations center and to designate the remaining

7   operations centers as slave operations centers. In this configuration, the master operations

8   center coordinates various functions among the slave operations centers such as synchronization

9   of simultaneous transmissions and distributes the operations workload efficiently.

10   4.   Cable Headend

11   After the operations center 202 has compressed and encoded the program signals and

12   transmitted the signals to the satellite, the cable headend 208 receives and further processes

13   the signals before they are relayed to each set top terminal 220. Each cable headend site is

14   generally equipped with multiple satellite receiver dishes. Each dish is capable of

15   handling multiple transponder signals from a single satellite and sometimes from multiple

16   satellites.

17   With reference to Figure 3, as an intermediary between the set top terminals 220 and

18   the operations center 202 and master control uplink site 211 (or other remote site), the cable

19   headend 208 performs two primary functions. First, the cable headend 208 acts as a

20   distribution center, or signal processor, by relaying the program signal to the set top terminal

21   220 in each subscriber's home. In addition, the cable headend 208 acts as a network

22   controller 214 by receiving information from each set top terminal 220 and passing such

23   information on to an information gathering site such as the operations center 202.

24   Figure 3 shows an embodiment where the cable headend 208 and the subscriber's

25   home are linked by certain communications media 216. In this particular embodiment, analog

26   signals, digitally compressed signals, other digital signals and up-stream/interactivity signals are

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1   sent and received over the media 216. The cable headend 208 provides such signaling

2   capabilities in its dual roles as a signal processor 209 and network controller 214.

3   As a signal processor 209, the cable headend 208 prepares the program signals that

4   are received by the cable headend 208 for transmission to each set top terminal 220. In the

5   preferred system, the signal processor 209 re-routes or demultiplexes and recombines the

6   signals and digital information received from the operations center 202 and allocates different

7   portions of the signal to different frequency ranges. Cable headends 208 which offer different

8   subscribers different program offerings may allocate the program signals from the operations

9   center 202 in various manners to accommodate different viewers. The signal processor 209

10   may also incorporate local programming and/or local advertisements into the program signal

11   and forward the revised signal to the set top terminals 220. To accommodate this local

12   programming availability, the signal processor 209 must combine the local signal in digital or

13   analog form with the operations center program signals. If the local cable system uses a

14   compression standard that is different than the one used by the operations center 202, the signal

15   processor 209 must also decompress and recompress incoming signals so they may be

16   properly formatted for transmission to the set top terminals 220. This process becomes less

17   important as standards develop (i.e., MPEG 2). In addition, the signal processor 209 performs

18   any necessary signal decryption and/or encryption.

19   As a network controller 214, the cable headend 208 performs the system control

20   functions for the system. The primary function of the network controller 214 is to manage the

21   configuration of the set top terminals 220 and process signals received from the set top

22   terminals 220. In the preferred embodiment, the network controller 214 monitors, among other

23   things, automatic poll-back responses from the set top terminals 220 remotely located at each

24   subscribers' home. The polling and automatic report-back cycle occurs frequently enough to

25   allow the network controller 214 to maintain accurate account and billing information as well

26   as monitor authorized channel access. In the simplest embodiment, information to be sent to

27   the network controller 214 will be stored in RAM within each subscriber's set top terminal 220

-14-

1   and will be retrieved only upon polling by the network controller 214. Retrieval may, for

2   example, occur on a daily, weekly or monthly basis. The network controller 214 allows the

3   system to maintain complete information on all programs watched using a particular set top

4   terminal 220.

5   The network controller 214 is also able to respond to the immediate needs of a set top

6   terminal 220 by modifying a program control information signal received from the operations

7   center 202. Therefore, the network controller 214 enables the delivery system to adapt to the

8   specific requirements of individual set top terminals 220 when the requirements cannot be

9   provided to the operations center 202 in advance. In other words, the network controller 214

10   is able to perform "on the fly programming" changes. With this capability, the network

11   controller 214 can handle sophisticated local programming needs such as, for example,

12   interactive television services, split screen video, and selection of different foreign languages for

13   the same video. In addition, the network controller 214 controls and monitors all compressors

14   and decompressors in the system.

15   The delivery system 200 and digital compression of the preferred embodiment provides

16   a one-way path from the operations center 202 to the cable headend 208. Status and billing

17   information is sent from the set top terminal 220 to the network controller 214 at the cable

18   headend 208 and not directly to the operations center 202. Thus, program monitoring and

19   selection control will take place only at the cable headend 208 by the local cable company and

20   its decentralized network controllers 214 (i.e., decentralized relative to the operations center

21   202, which is central to the program delivery system 200). The local cable company will in turn

22   be in communication with the operations center 202 or a regional control center (not shown)

23   which accumulates return data from the set top terminal 220 for statistical or billing purposes.

24   In alternative system embodiments, the operations center 202 and the statistical and billing sites

25   are collocated. Further, telephone lines with modems are used to transfer information from the

26   set top terminal 220 to the statistical and billing sites.

1   5.   Set Top Terminal

2   The set top terminal 220 is the portion of the delivery system 200 that resides in the

3   home of a subscriber. The set top terminal 220 is usually located above or below the

4   subscriber's television, but it may be placed anywhere in or near the subscriber's home as long

5   as it is within the range of the subscriber's remote control device 900. In some aspects, the set

6   top terminal 220 may resemble converter boxes already used by many cable systems. For

7   instance, each set top terminal 220 may include a variety of error detection, decryption, and

8   coding techniques such as anti-taping encoding. However, it will become apparent from the

9   discussion below that the set top terminal 220 is able to perform many functions that an

10   ordinary converter box cannot perform.

11   The set top terminal 220 has a plurality of input and output ports to enable it to

12   communicate with other local and remote devices. The set top terminal 220 has an input port

13   that receives information from the cable headend 208. In addition, the unit has at least two

14   output ports which provide communications from the set top terminal 220 to a television and

15   a VCR. Certain menu selections may cause the set top terminal 220 to send control signals

16   directly to the VCR to automatically program or operate the VCR. Also, the set top terminal

17   220 contains a phone jack which can be used for maintenance, trouble shooting,

18   reprogramming and additional customer features. The set top terminal 220 may also contain

19   stereo/audio output terminals and a satellite dish input port.

20   Functionally, the set top terminal 220 is the last component in the delivery system chain.

21   The set top terminal 220 receives compressed program and control signals from the cable

22   headend 208 (or, in some cases, directly from the operations center 202). After the set top

23   terminal 220 receives the individually compressed program and control signals, the signals are

24   demultiplexed, decompressed, converted to analog signals (if necessary) and either placed in

25   local storage (from which the menu template may be created), executed immediately, or sent

26   directly to the television screen.

1   After processing certain signals received from the cable headend 208, the set top

2   terminal 220 is able to store menu templates for creating menus that are displayed on a

3   subscriber's television by using an array of menu templates. Before a menu can be constructed,

4   menu templates must be created and sent to the set top terminal 220 for storage. A

5   microprocessor uses the control signals received from the operations center 202 or cable

6   headend 208 to generate the menu templates for storage. Each menu template may be stored

7   in volatile memory in the set top terminal 220. When the set top terminal receives template

8   information it demultiplexes the program control signals received from the cable headend 208

9   into four primary parts: video, graphics, program logic and text. Each menu template

10   represents a different portion of a whole menu, such as a menu background, television logo,

11   cursor highlight overlay, or other miscellaneous components needed to build a menu. The menu

12   templates may be deleted or altered using control signals received from the operations center

13   202 or cable headend 208.

14   Once the menu templates have been stored in memory, the set top terminal 220 can

15   generate the appropriate menus. In the preferred embodiment, the basic menu format

16   information is stored in memory located within the set top terminal 220 so that the

17   microprocessor may locally access the information from the set top terminal instead of from an

18   incoming signal. The microprocessor next generates the appropriate menus from the menu

19   templates and the other menu information stored in memory. The set top terminal 220 then

20   displays specific menus on the subscriber's television screen that correspond to the inputs the

21   subscriber selects.

22   If the subscriber selects a specific program from a menu, the set top terminal 220

23   determines on which channel the program is being shown, demultiplexes and extracts the single

24   channel transmitted from the cable headend 208. The set top terminal 220 then decompresses

25   the channel and, if necessary, converts the program signal to an analog NTSC signal to enable

26   the subscriber to view the selected program. The set top terminal 220 can be equipped to

27   decompress more than one program signal, but this would unnecessarily add to the cost of the

-17-

1   unit since a subscriber will generally only view one program at a time. However, two or three

2   decompressors may be desirable to provide picture-on-picture capability, control signal

3   decompression, enhanced channel switching or like features.

4   In addition to menu information, the set top terminal 220 may also store text transmitted

5   from the cable headend 208 or the operations center 202. The text may inform the subscriber

6   about upcoming events, billing and account status, new subscriptions, or other relevant

7   information. The text will be stored in an appropriate memory location depending on the

8   frequency and the duration of the use of the textual message.

9   Also, optional upgrades are available to enhance the performance of a subscriber's set

10   top terminal 220. These upgrades may consist of a cartridge or computer card (not shown)

11   that is inserted into an expansion slot in the set top terminal 220 or may consist of a feature

12   offered by the cable headend 208 or operations center 202 to which the user may subscribe.

13   Available upgrades may include on line data base services, interactive multi-media services,

14   access to digital radio channels, and other services.

15   In the simplest embodiment, available converter boxes such as those manufactured by

16   General Instruments or Scientific Atlanta, may be modified and upgraded to perform the

17   functions of a set top terminal 220. The preferred upgrade is a circuit card with a

18   microprocessor which is electronically connected to or inserted into the converter box.

19   6.   Remote Control Device

20   The primary conduit for communication between the subscriber and the set top terminal

21   220 is through the subscriber interface, preferably a remote control device 900. Through this

22   interface, the subscriber may select desired programming through the system's menu-driven

23   scheme or by directly accessing a specific channel by entering the actual channel number.

24   Using the interface, the subscriber can navigate through a series of informative program

25   selection menus. By using menu-driven, iconic or alpha-character access, the subscriber can

26   access desired programs by simply pressing a single button rather than recalling from memory

27   and pressing the actual channel number to make a selection. The subscriber can access regular

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1 broadcast and basic cable television stations by using either the numeric keys on the remote

2 control 900 (pressing the corresponding channel number), or one of the menu icon selection

3 options.

4 In addition to enabling the subscriber to easily interact with the cable system 200, the

5 physical characteristics of the subscriber interface 900 should also add to the user friendliness

6 of the system. The remote control 900 should easily fit in the palm of the user's hand. The

7 buttons of the preferred remote control 900 contain pictorial symbols that are easily identifiable

8 by the subscriber. Also, buttons that perform similar functions may be color coordinated and

9 consist of distinguishing textures to increase the user friendliness of the system.

10 7. Menu-Driven Program Selection

11 The menu-driven scheme provides the subscriber with one-step access to all major

12 menus, ranging from hit movies to sport specials to specialty programs. From any of the major

13 menus, the subscriber can in turn access submenus and minor menus by cursor or alpha-

14 character access.

15 There are two different types of menus utilized by the preferred embodiment, the

16 Program Selection menus and the During Program menus. The first series of menus, Program

17 Selection menus, consists of an Introductory, a Home, Major menus, and Submenus. The

18 second series of menus, During Program menus, consists of two primary types, Hidden menus

19 and the Program Overlay menus.

20 Immediately after the subscriber turns on the set top terminal 220, the Introductory

21 menu welcomes the subscriber to the system. The Introductory menu may display important

22 announcements from the local cable franchise, advertisements from the cable provider, or other

23 types of messages. In addition, the Introductory menu can inform the subscriber if the cable

24 headend 208 has sent a personal message to the subscriber's particular set top terminal 220.

25 After the Introductory menu has been displayed the subscriber may advance to the next

26 level of menus, namely the Home menu. In the preferred embodiment, after a certain period

27 of time, the cable system will advance the subscriber by default to the Home menu. From the

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1   Home menu, the subscriber is able to access all of the programming options. The subscriber

2   may either select a program directly by entering the appropriate channel number from the

3   remote control 900, or the subscriber may sequence through incremental levels of menu options

4   starting from the Home menu. The Home menu lists categories that correspond to the first level

5   of menus called Major menus.

6   If the subscriber chooses to sequence through subsequent menus, the subscriber will

7   be forwarded to the Major menu that corresponds to the chosen category from the Home

8   menu. The Major menus further refine a subscriber's search and help guide the subscriber to

9   the selection of his choice.

10   From the Major menus, the subscriber may access several submenus. From each

11   submenu, the subscriber may access other submenus until the subscriber finds a desired

12   television program. Similar to the Major menu, each successive level of Submenus further

13   refines the subscriber's search. The system also enables the subscriber to skip certain menus

14   or submenus and directly access a specific menu or television program by entering the

15   appropriate commands on the remote control 900.

16   The During program menus (including Hidden Menus and Program Overlay Menus)

17   are displayed by the set top terminal 220 only after the subscriber has selected a television

18   program. In order to avoid disturbing the subscriber, the set top terminal 220 does not display

19   the Hidden Menus until the subscriber selects the appropriate option to display a Hidden Menu.

20   The Hidden Menus contain options that are relevant to the program selected by the viewer.

21   For example, a Hidden Menu may contain options that enable a subscriber to enter an

22   interactive mode or escape from the selected program.

23   Program Overlay Menus are similar to Hidden Menus because they occur during a

24   program and are related to the program being viewed. However, the Program Overlay Menus

25   are displayed concurrently with the program selected by the subscriber. Most Program

26   Overlay Menus are small enough on the screen to allow the subscriber to continue viewing the

27   selected program comfortably.

1   B.   Operations Center With Computer Assisted Packaging System

2   Figure 4 broadly shows the configuration for the computer assisted packaging system

3   (CAP) 260 of the Operations Center 202. The primary components of the CAP 260 consist

4   of multiple packager workstations 262, a central processing unit 264, video/audio editing

5   equipment 266, and one or more databases 268 and 269. Additional remotely located

6   databases, such as local video storage database 267, and buffers 271 and controllers 272 for

7   external program feeds make up the peripherals of the CAP system 260.

8   The heart of the CAP 260 is a central processing unit 264 which communicates with

9   all the component parts of the CAP 260. The central processing unit 264 can be a powerful

10   PC, a mini-computer, a mainframe or a combination of computing equipment running in parallel.

11   The central processing unit 264 includes all the necessary interconnections to control peripheral

12   equipment such as the external video controls 272. The central processing unit 264 has

13   sufficient memory 274 to store the program instructions of the subroutines which operate the

14   CAP 260.

15   The CAP 260 receives data from one or more databases, such as the Operations

16   Center Database 268 and the Cable Franchise Information Database 269 shown in Figure 4.

17   In addition, separate databases are maintained of viewer information, such as demographics

18   and programs viewed. The CAP 260 can control the reception of external sources by enabling

19   and disenabling the external video controls 272. The external video controls 272 include

20   buffers to delay as necessary external programs received by the Operations Center 202.

21   The functions of the video/audio equipment 266 include digitizing analog programs,

22   digitizing and compressing analog programs (in a single step, e.g., MPEG), and compressing

23   digital program signals as requested by the central processing unit 264.

24   The CAP 260 receives video and audio from two sources: internally from a local video

25   storage 267 and externally from external sources through external video controls 272. When

26   necessary, video is manipulated, formatted and/or digitized using video/audio equipment 266

27   which is controlled by CAP 264.

1   Referring back to Figure 2, an overview of an operating cable television menu driven

2   program delivery system 200 highlighting various external programming signal sources 212 is

3   depicted. The Operations Center 202 is shown receiving external programming signals which

4   correspond to particular programming categories that are available for a subscriber's viewing.

5   These external signals may be in analog or digital form and may be received via landline,

6   microwave transmission, or satellite. Some of these external signals may be transmitted from

7   the program source 212 to the Operations Center 202 in compressed digital format or other

8   nonstandard digital formats. These external signals are received and packaged with

9   programming that is stored at the Operations Center 202.

10   Examples of external program sources 212 shown in Figure 2 are: Sporting events,

11   children's programs, documentaries, high definition TV sources, specialty channels, interactive

12   services, weather, news, and other nonfiction or entertainment. Any source that can provide

13   either audio or video or both may be utilized to provide programming to the Operations Center

14   202.

15   In order to achieve the required throughput of video and audio information for the

16   system, digital compression techniques are employed. A television signal is first digitized. The

17   object of digitization is two-fold: First, in the case of an analog signal, like a television picture,

18   digitization allows the signal to be converted from a waveform into a digital binary format.

19   Secondly, through the use of digital compression techniques, standard digital formats are

20   designed to have the resulting pictures or video stills take up less space on their respective

21   storage mediums. Essentially, as described below, a standard digital format will define the

22   method of compression used.

23   There are three basic digital compression techniques: within-frame (intraframe), frame-

24   to-frame (interframe), and within-carrier. Intraframe compression processes each frame in a

25   television picture to contain fewer visual details and, therefore, the picture contains fewer digital

26   bits. Interframe compression transmits only changes between frames, thus omitting elements

27   repeated in successive frames. Within-carrier compression allows the compression ratio to

1   dynamically vary depending upon the amount of changes between frames. If a large number

2   of changes occur between frames, the compression ratio drops from, for example, sixteen-to-

3   one to eight-to-one. If action is intense, the compression ratio may dip to four to one.

4   Several standard digital formats representing both digitizing standards and compression

5   standards have been developed. For example, JPEG (joint photographic experts group) is a

6   standard for single picture digitization. Motion picture digitization may be represented by

7   standards such as MPEG or MPEG2 (motion picture engineering group specifications). Other

8   proprietary standards have been developed in addition to these. The preferred embodiment

9   uses the MPEG-2 standard of coding and those of ordinary skill in the art are presumed to be

10   familiar with the MPEG-2 standard. The MPEG-2 Systems Working Draft Proposal from the

11   Systems Committee of the International Organization For Standardization, document ISO/IE

12   JT1/SC29/WG11 "N0531" MPEG93 dated September 10, 1993, is hereby incorporated by

13   reference. Although MPEG and MPEG2 for motion pictures are preferred in the present

14   invention, any reliable digital format with compression may be used with the present invention.

15   Various hybrids of the above compression techniques have been developed by several

16   companies including AT&T, Compression Labs, Inc., General Instrument, Scientific-Atlanta,

17   Phillips, and Zenith. As is known by those skilled in the art, any of the compression techniques

18   developed by these companies, and other known techniques, may be used with the present

19   invention.

20   With reference to Figure 4, the human intervention in this system is conducted by a

21   programmer or program packager operating from the one or more work stations 262

22   connected to the system. These work stations 262 are preferably intelligent work stations with

23   large CRT screens. In the preferred embodiment, a suitable keyboard, mouse and color

24   monitor are used with the workstation. From these work stations, the packager can create

25   program lineups, prioritize programs, initiate dynamic menu allocation, initiate dynamic

26   bandwidth allocation, design menus, place program names and descriptions onto menus, create

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1   menus with still and live video, move text on menus, change the colors of objects on menus and

2   perform various other tasks for the program delivery system 200.

3   Almost any Operations Center 202 function that normally requires human intervention

4   can be conducted at the packager workstation 262. Although data entry for the databases can

5   be performed manually at the workstations 262, it is preferred that the data entry be completed

6   through electronic transfers of information. Alternatively, the data can be loaded from

7   customary portable storage media such as magnetic disks or tape.

8   An integral part of the Computer Assisting Packaging system is the retrieval of viewer

9   data, and the assimilation of that data into the program packaging method (especially the menu

10   configuration) as discussed in reference to Figure 8 MII 402. This involves two main steps,

11   first, retrieval of raw data from the set top terminals, and then filtering and presenting that data.

12   Each headend 208 compiles the viewer data, and then sends it verbatim to the Operations

13   Center 202. This raw data is necessary because different responsibilities of the Operations

14   Center 202 require different parts of the raw information. Also a record must be kept of

15   overall data. Once the data is assembled at the Operations Center 202, the data is filtered for

16   each application.

17   The raw data gathered includes but is not limited to:

18   •   What programs a viewer purchased and when it was purchased

19   •   What channel a specific viewer watched and for how long.

20   This information can then be used to calculate the following:

21   •   How many viewers watched a particular program.

22   •   Peak viewing times for different categories of shows.

23   •   Buy rates for particular menu positions.

24   Menu creation, both automatically and manually, is one of the major CAP functions that

25   involves the incorporation of the raw data. An automated software procedure (such as the

26   EIS) analyzes the data and, using certain heuristics, creates the menus.

1   One heuristic, for example, is that when a show is not ordered frequently, it is moved

2   closer to the top of the menu for greater visibility. The filtering of the data allows it to be sorted

3   and indexed for display to the user. The program data can be filtered into a new database

4   containing program names and indexed by the number of times each program was purchased.

5   The data can also be indexed by buy times and program categories.

6   Certain metrics are established to help in evaluating the data. Using the EIS or similar

7   software, sales by menu placement, cost, category and lifespan can be pulled up for viewing

8   in graphic presentation. The graphic presentation, in the form of line or bar graphs, help the

9   packager recognize any trends in the data. For example, the first movie on a movie menu might

10   not have sold as well as a second movie listed. A chart can be pulled up to reveal that the first

11   movie has been at the top of the menu for two weeks and buy rates are naturally falling off.

12   Steps can then be taken to move items in the menus to correct this, though many of these steps

13   are automated in the menu creation system. Suggested changes can be displayed to help the

14   user in this task.

15   The automated procedures create menus that are distinct between headends 208

16   because of demographic differences in the viewing audience. To help with this, a separate

17   database of viewer demographics exists and is frequently updated. The headends 208 are able

18   to alter the menu positions in order to further tailor the presentation, or to add local shows.

19   Any changes to the menus are sent back to the Operations Center 202 at the same time as the

20   viewer data, in order to prevent erroneous data analysis. Menu changes at the cable headend

21   are described in detail in U.S. Patent Application Ser. No. 08/160,280, filed December 2,

22   1993, entitled NETWORK CONTROLLER FOR A CABLE TELEVISION SYSTEM, U.S.

23   Patent No. 5,600,364.

24   Another use for the indexed data is creation of marketing reports. Programming

25   changes are helped by accurate information on viewer preference. Also viewer purchasing

26   trends, and regional interests can be tracked.

1   In the preferred embodiment, an Executive Information System (EIS) is used to give

2   high level access to both "buy" (what the customer purchases) and "access" (when the product

3   was viewed, how often and duration) data. The EIS represents information in both a graphical

4   and summary report format. "Drill down" functions in the EIS help the packager derive the

5   appropriate product (product refers to programs, events or services) mix.

6   The purpose of the EIS is to provide an on-line software tool that will allow for real-

7   time evaluation of current product positioning. The design of the system consists of user

8   friendly icons to guide the user through available functions. The functionality in the system

9   provides general information on current programming sales status. By working through the tiers

10   in the system, the user has access to more specific information. The system is designed to

11   shield the user from a long learning curve and information overload.

12   The graphical tools allow for analysis of current data through the use of multiple graph

13   types such as line graphs, bar and pie charts. These tools will allow the user to manipulate

14   independent variables such as time (hour, day of the week, week, month), demographic

15   information, program category information (genre, property, events), headend information and

16   pricing information for determining the appropriate programming mix within the allotted time

17   slots.

18   The system also allows the packager to derive expected monetary returns through

19   program line-ups by integrating outside industry databases. For instance, the system could be

20   used to determine expected returns from a particular program by correlating buy information

21   from the existing programs in the line up with a viewer ratings service database to determine

22   the outcome of programs within a particular genre not in the current line up.

23   Report tools within the EIS aggregate buy access at the highest level. Due to the

24   volume of available information statistical analysis methods are used for deriving marketing

25   intelligence within the EIS.

26   A yield management tool is incorporated within the EIS. The yield management tool

27   encompasses operations research techniques, statistical methods and neural net technology to

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1   decide program mix as it pertains to program substitutes, program complements, time slice

2   positioning, repetitions and menu positioning.

3   This system is automated to the extent of providing viable alternative as to the proposed

4   product mix. The system encompasses a Monte Carlo simulation for developing alternative

5   product mix scenarios. The system feeds from both internal data and external industry data

6   sources to provide expected revenue projections for the different scenarios. Other software

7   subroutines of the CAP will automatically call upon the EIS to assist the program in

8   important decision making, such as menu configuration and transponder allocation. Human

9   interaction is required to change marketing parameters for fine tuning the desired product

10   scheduling.

11   Although the packaging of the program information and programs, including the

12   creation of program control information, program lineup and menu designing configuration, is

13   conducted at the CAP 260, all other functions of the Operations Center 202 can be controlled

14   by a second separate processing unit (shown in Figure 5 at 270). This second processing unit

15   270 is the Delivery Control Processing Unit 270, and can perform the tasks of incorporating

16   the program control information signal from the CAP 260, coordinating the receipt and

17   combining of external program video/audio and internal video/audio and combining the signals

18   as necessary for transmission. This distribution of functions among the CAP 260 and Delivery

19   Control Processing Unit 270 allows for greater speed and ease of use.

20   Figure 5 shows a more detailed diagram of the CAP 260 and the Delivery Control

21   Processor Unit 270. Once external and stored digital and analog sources have been converted

22   into a standard digital format 274, they are input into standard digital multiplex equipment 273

23   (of the type manufactured by Scientific Atlanta, General Instruments, and others). Additionally,

24   the Program Control Information Signal 276 is input into the digital multiplex equipment 273.

25   These inputs 274, 276 are multiplexed appropriately under the control of the Delivery Control

26   Processor Unit 270 as commanded by the CPU 264. The Delivery Control Processor Unit

27   270 is also responsible for the generation of the Program Control Information Signal 276 based

1   on information received from the CPU 264. The Delivery Control Processor Unit 270 allows

2   for the off-loading of real-time and near real-time tasks from the CPU 264. The CPU 264, as

3   described earlier, processes information within its database and provides user access to the

4   CAP 260 via multiple user workstations 262 . The high-speed digital output 278 from the

5   digital multiplex equipment 273 is then sent on to the compression (if necessary), multiplexing,

6   modulation and amplification hardware, represented at 279.

7   C.   The Program Control Information Signal

8   The following table, TABLE A, is an example of some information that can be sent in

9   the program control information signal to the set top terminals 220. The program control

10   information signal generated by the Operations Center 202 provides data on the scheduling and

11   description of programs via the network controller 214 or, in an alternate configuration, directly

12   to the set top terminal 220 for display to the subscriber.

13   In the preferred embodiment, the program control information signal 276 is stored and

14   modified by the network controller 214 and sent to the set top terminal 220 in the form of a set

15   top terminal control information stream (STTCIS). This configuration accommodates

16   differences in individual cable systems and possible differences in set top converter or terminal

17   devices. The set top terminal 220 of the present invention integrates either the program control

18   signal 276 or the STTCIS, together with data stored in the memory of the set top terminal 220,

19   to generate on-screen menu displays for assisting the subscriber in choosing programs for

20   viewing. (Throughout the description the term "program control information" is being used to

21   indicate control information coming from the cable headend 208 to the set top terminal 220,

22   whether it is sent directly from the Operations Center 202, processed by the network controller

23   214, and then forwarded to the set top terminal as STTCIS, or transmitted over telephone

24   lines.)

25   With further reference to TABLE A below, the types of information that can be sent

26   via the program control signal include: number of program categories, names of program

27   categories, what channels are assigned to a specific category (such as specialty channels),

1   names of channels, names of programs on each channel, program start times, length of

2   programs, description of programs, menu assignment for each program, pricing, whether there

3   is a sample video clip for advertisement for the program, and any other program, menu or

4   product information.

5   The goal of the menu driven program selection system of the present invention,

6   described in greater detail in U.S. Patent Application Serial No. 08/160,193, filed December

7   2, 1993, entitled SET TOP TERMINAL FOR CABLE TELEVISION DELIVERY

8   SYSTEM, now U.S. Patent No. 5,734,853, owned by the assignee of the present invention

9   and incorporated herein by reference, is to allow the subscriber to choose a program by touring

10 through a series of menus utilizing a remote control 900 for cursor movement. The final choice

11 in the series of menus will identify one particular channel and one time for activation of that

12 channel. Armed with a channel and activation time the set top terminal 220 can display the

13 selected program on the television for the viewer. To achieve this goal, an intelligent alpha-

14 numeric code is assigned to each program. This alpha-numeric code identifies the category of

15 the program, the menu in which the program should be displayed, its transmission time(s), and

16 the position on the menu that the program should be displayed. In a preferred embodiment,

17 the program control information, including menu codes, is sent continuously from the

18 Operations Center 202 to the network controller 214, and ultimately to the set top terminal

19 220. For example, four hours worth of programming information can be sent via the program

20 control information signal continuously in the format shown in TABLE A.

21 TABLE A shows the basic information that is needed by the set top terminal 220. The

22 program descriptions shown are coded abbreviations. For example, C stands for comedy, N

23 for news, S for sports, A for cartoons, and TX for text. If there is a textual description for a

24 program, such as a movie, the description may be given following that program's coded

25 description or may be communicated following the four hours of programming information. As

26 is shown in the coded listing, program descriptions for programs greater than a half hour in

1 length need not be repeated (each half hour). The video description code informs the set top

2 terminal 220 whether there is still or live video available to advertise the program.

3 ## TABLE A

4 **12:00 PM**

*Program Name	*Program Length	*Menu Code	*Description	*Video
1 Cheers	.5	E24	C	N
2 Terminator	2.0	A33	Tx	S
3 PrimeTime	1.0	D14	N	N
4 Football	.5	B24	S	N
●				
●				
●				
●				

12:30 PM

*Program Name	*Program Length	*Menu Code	*Description	*Video
1 Simpsons	.5	E14&C13	C	S
4 Football Game	3.0	B13	S	N

20 For example, a sporting program may be assigned a code of B35-010194-1600-3.25-

21 Michigan St. vs. USC. The letter B would assign the program to category B, sports. The

22 second alpha-numeric character number 3 would assign the program to the third menu of the

23 sports category. The third character of the code, number 5, assigns the program to the fifth

24 program slot on the third menu. The next six characters, 01/01/94, represent the date. The

25 following four characters, 1600 represent the start time which is followed by the length of the

26 program and the program name. This entry represents a sports show, a college football game,

27 which will be aired at 4:00PM on New Years day 1994.

28 In the 12:30 Channel 1 entry of TABLE A, two menu codes are shown. By allowing

29 two menu codes, programs that may fit under two different category descriptions may be

30 shown in both menus to the subscriber. With this minimal amount of information being

31 communicated to the set top terminal 220 on a regular basis, the terminal is able to determine

32 the proper menu location for each program and the proper time and channel to activate for the

-30-

1   subscriber after his menu selection. In the preferred embodiment, the menu codes are

2   generated at the Operations Center 202.

3   Table B shows an example Events Table that may be downloaded to a set top terminal

4   220 using the Event Data file which contains information about events and pricing. As shown

5   in the table, the three columns of the Events Table identify the field number, the field itself and

6   the type of information downloaded in the Event Data file. The first column contains the field

7   numbers 1 through 11. The middle column contains the corresponding field parameters,

8   including the event type, event ID, global channel ID, price, start time, end time, start date, end

9   date, P- icon, name and description. The third column contains corresponding field type

10   information. As shown in this field type information typically consists of an unsigned integer;

11   hours, minutes and seconds; months, day and year; and ASCII character identifier.

TABLE B

Field #	Field	Type
1	Event Type 1 = YCTV 2 = Pay-Per-View 3 = Reg. TV	Unsigned Int
2	Event ID	Unsigned Int
3	Global Channel ID	Unsigned Int
4	Price (in Cents)	Unsigned Int
5	Start Time	HH:MM:SS
6	End Time	HH:MM:SS
7	Start Date	MM/DD/YY
8	End Date	MM/DD/YY
9	P-Icon	ASCIIZ
10	Name	ASCIIZ
11	Description	ASCIIZ

30   Table C shows an example Event Data data file. In particular, Table C shows two

31   data streams corresponding to two event types. The first data stream identifies a YCTV event

32   in the first field. The second field designates the event ID, which is 1234 in this example. The

33   third field includes the global channel ID number two. The fourth field indicates the cost of 50

-31-

1   cents for this event. The fifth and sixth fields indicate the respective start and end times of 3:00

2   a.m. to 3:00 p.m., respectively. The seventh and eighth fields show the corresponding start and

3   end date, designated as 8/25/93 and 8/27/93, respectively. Field nine indicates the P icon set

4   to a graphics file. Finally, fields ten and eleven indicate the name and description of the event

5   selected, which in this case is Sesame Street™ and Barney™. The second data stream in the

6   Event.Dat example shown in Table C includes analogous information for Terminator IV™,

7   which is designated in field one as a pay-per-view event.

8   **TABLE C**

9   **Event Data Example**

10 | 1`1234`2`50`03:00:00`15:00:00`08/25/93`08/27/93`pbs.pcx`Sesame Street & Barney's Sesame Street and Barney |
11 | Abstract |
12 | 2`1234`2`50`20:00:00`22:00:00`08/25/93`08/25/93`t4.pcx`Terminator 4`Terminator 4 Abstract |

13   The program control information signal 276 and STTCIS can be formatted in a variety

14   of ways and the on-screen menus can be produced in many different ways. For instance, if the

15   program control information signal 276 carries no menu format information, the menu format

16   for creating the menus can be fixed in ROM at the set top terminal 220. This method allows

17   the program control signal 276 to carry less information but has the least flexibility since the

18   menu formats cannot be changed without physically swapping the ROM holding the menu

19   format information. In the preferred embodiment, the menu format information is stored at the

20   set top terminal 220 in temporary memory either in a RAM or EPROM. This configuration

21   provides the desired flexibility in the menu format while still limiting the amount of information

22   needed to be communicated via the program control information signal 276. New menu format

23   information would be sent via the program control information signal 276 or the STTCIS to the

24   set top terminals 220 each time there was a change to a menu.

25   In the simplest embodiment, the menus remain fixed and only the text changes. Thus,

26   the program control information signal 276 can be limited to primarily text and a text generator

27   can be employed in the set top terminal 220. This simple embodiment keeps the cost of the

1   set top terminal 220 low and limits the bandwidth necessary for the program control

2   information. Another simple embodiment uses a separate channel full-time (large bandwidth)

3   just for the menu information.

4   Figures 6a and 6b, particularly Figure 6a, show a data format 920 at the bit-level for

5   one embodiment of a program information signal 276. This frame format consists of six fields,

6   namely: (1) a leading flag 922 at the beginning of the message, (2) an address field 924, (3)

7   a subscriber region designation 926, (4) a set top terminal identifier 928 that includes a polling

8   command/response (or P/F) bit 930, (5) an information field 932, and (6) a trailing flag 934 at

9   the end of the message.

10   The eight-bit flag sequence that appears at the beginning 922 and end 927 of a frame

11   is used to establish and maintain synchronization. Such a sequence typically consists of a

12   "01111110" bit-stream. The address field 924 designates a 4-bit address for a given set top

13   terminal 220. The subscriber region designation 926 is a 4-bit field that indicates the

14   geographical region in which the subscriber's set top terminal 220 is housed. The set top

15   terminal identifier 928 is a 16-bit field that uniquely identifies each set top terminal 220 with a

16   15-bit designation followed by an appended P/F bit 930. Although field size is provided by

17   this example, a variety of sizes can be used with the present invention.

18   The P/F bit 930 is used to command a polling response 920' (Figure 6b) from the set

19   top terminal 220 addressed. The polling response 920' is substantially similar to the from

20   format 920, and is commonly numbered, but with a prime (') designation appended for clarity.

21   The frame format 920 also provides a variable-length information field 932 for other data

22   transmissions, such as information on system updates. The frame format ends with an 8-bit flag

23   934 (or trailing flag) that is identical in format to the leading flag 922, as set forth above. Other

24   frame formats, such as MPEG, for example, will be apparent to one skilled in the art and can

25   be easily adapted for use with the system.

1   D.   <u>Software Subroutines</u>

2   The program control information signal 276 is produced substantially by the CAP CPU

3   264 and the Delivery Control Processor Unit (DCPU) 270. An overview of the software

4   modules, focusing on the processing of signals and communication between CAP CPU 264

5   and DCPU 270 is shown in Figure 7. The software modules for the CAP CPU 264 and

6   DCPU 270 include dispatcher 484, processing 486 and communications 488, each of which

7   performs like-named functions, as well as supporting database 490 access. Processing within

8   the CAP CPU 264 is controlled by the dispatcher 484 software module which may generate

9   processing commands based on user command (e.g., do something now), schedule events

10   (e.g., do something at noon) or based on the occurrence of other events (e.g., do something

11   when the database is updated). The dispatcher 484 sends messages to the processing software

12   module 486 instructing it to process information within the database 490 and generate control

13   information for the DCPU 270. For example, based on the updating of information associated

14   with a particular headend 208, the dispatcher 484 may command the CAP CPU 264 to

15   regenerate headend 208 parameters, perform any required database integrity checking and

16   send them to the DCPU 270. Also, in the case of headend 208 information processing, a

17   filtering function (not shown) is performed which eliminates any information that does not either

18   directly or indirectly relate to a given headend 208. Information transfer between the CAP

19   CPU 264 and the DCPU 270 is controlled by the DCPU communications software module

20   488.

21   Information received by the DCPU 270 from the CAP CPU 264 is processed at the

22   DCPU processing module 496 and put into a form consistent with the DCPU 270. Some of

23   this information is used for DCPU control, while most is data to be integrated into the program

24   control information signal 261. Some of this information is also used for miscellaneous control

25   494 for such things as external multiplex equipment, source material generation hardware,

26   transmission equipment and so on. Information destined for the program control information

27   signal 261 may be transmitted once or may be scheduled for periodic transmission. This

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1   information is integrated by the processing module 496 with other information, both internal and

2   external. The DCPU scheduler module 497 is responsible for scheduling and regulating this

3   data traffic. Also, the scheduler 497 may perform information filtering. For example,

4   imbedded date/time information within the information records of interest can be used for

5   filtering. External pass-through control information 495 may also be incorporated into the

6   program control information signal 261 to provide external input to this digital data stream. The

7   DCPU multiplexer 498 is responsible for multiplexing external pass-through control information.

8   Finally, a transmission software module 499 in conjunction with appropriate communications

9   hardware (not shown), controls the output of both the program control information signal 261

10   and the miscellaneous control signals 494.

11   Figure 8 is a high level diagram of CAP software subroutines and their interrelations.

12   A Main Program (not shown) orchestrates the use of the various subroutines as needed to

13   perform the CAP's tasks. The Packager Data Entry Interface (PDEI) 400, Marketing

14   Information Interface (MII) 402, and Cable Franchise Information Access (CFIA) 404

15   subroutines perform the interface functions between the CAP Main Program and outside data

16   or information. The remaining subroutines shown in the center column of Figure 8 perform the

17   processing and manipulations necessary to the functioning of the CAP 260.

18   The Packager Data Entry Interface (PDEI) 400 subroutine includes routines that

19   enable the Packager to interactively enter program selections 410, start times of programs 412,

20   price setting 414, transponder allocation 416, and menu editing 418. The PDEI subroutine 400

21   controls the keyboard and mouse data entry by the packager and runs in concert with the

22   processing and editing subroutines described later.

23   The Marketing Information Interface (MII) 402 subroutine interfaces the processing

24   and editing subroutines with marketing data. This interface regularly receives programs

25   watched information from billing sites 420, cable headends 208, or set top terminals 220. In

26   addition, other marketing information 422 such as the demographics of viewers during certain

27   time periods may be received by the MII 402. The MII 402 also uses algorithms 424 to

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1   analyze the program watched information and marketing data 420, 422, and provides the

2   analyzed information to the processing and editing subroutines. In the preferred embodiment,

3   an Executive Information System (EIS) with a yield management subsystem is included in the

4   MII subroutine as described above.

5   The Cable Franchise Information Access (CFIA) 404 subroutine receives information

6   on cable franchises, as represented at block 426, such as the particular equipment used in a

7   cable headend 208, the number of set top terminals 220 within a cable franchise, groupings of

8   set top terminals 220 on concatenated cable systems 210, distribution of "high-end" cable

9   subscribers, etc. The CFIA 404 generates a cable franchise control signal 428 which is

10   integrated with the program control information 276 output to generate cable headend 208

11   specific information to be transmitted. The integration algorithm for accomplishing this resides

12   within the Generator subroutine described herein below.

13   The process program line-up subroutine 430 uses information from the MII 404 and

14   PDEI 400 to develop a program line-up. Importance weighting algorithms and best fit time

15   algorithms are used to assign programs in time slots.

16   The process menu configurations subroutine 432 determines appropriate menu formats

17   to be used and positions programs on menu screens. Information from the MII 404 and PDEI

18   400 are used to determine program positions on menus.

19   The menu display algorithms 434 displays menus as the menus would be seen by the

20   viewer on a large CRT or color monitor.

21   The editing of menus subroutine 436 works with the menu display algorithm and PDEI

22   400 to allow the packager to edit menus on-the-fly during viewing of the menus.

23   The graphical transponder allocation display 438 sends information obtained from the

24   CFIA 404 and PDEI 400 to create graphical displays enabling the packager to comprehend

25   the allocation of transponder space across the entire television delivery system 200.

26   In a manner similar to the display and editing of menus represented at blocks 434, 436,

27   the packager may utilize the editing transponder allocation subroutine 440 to interactively

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1   reallocate assignment of transponder space. In the preferred embodiment, the EIS with yield

2   management may be used by the packager to assist in decisions on allocating transponder

3   space.

4   The generator subroutine 442 creates the program control information signal for output.

5   The Generator subroutine receives the cable franchise control signal and uses this signal to help

6   create a custom signal for each cable headend 208.

7   The Packaging Routine 448 obtains and packages the programs, along with the

8   program control information signal 216, for transmission to the transponders.

9   With continued reference to Figures 7, 8 and 9, the general software flow of the

10   operations center 202 is depicted. The flow can be broken up into modules that apply to parts

11   of the database to allow viewing, editing, and adding records to the database. The software

12   also accomplishes database integrity checking by restricting the user to enter only valid data,

13   and by checking for conflicts.

14   Figure 9 shows some of the software involved in the creation of programs, events and

15   services. This creation occurs prior to or during the processing of the program line-up 430

16   shown in Figure 8. With reference to Figure 9, a first step is indicated generally at 461 and

17   includes acquiring source materials for program production at the Operations Center 202 (e.g.,

18   tape production). Once the source materials are collected 460, and entered into the database

19   "D", they can be used to create programs 462. These programs are made up of source "cuts"

20   from various video/audio source materials. Once the programs have been generated and

21   entered into the database "D", events, collections of one or more programs, are created 464.

22   Each event is then schedule onto a service 466, with the software checking for conflicts. Each

23   service is given run times, and days, and checked for conflicts. Once the services and events

24   have been created, the event names can be added to the menus 468. The programs for the

25   events and services may be stored at the Operations Center (as shown in Figure 11 at 286).

26   Processing and manipulation of the events or records is depicted generally at 463.

1   The packager user interface (a portion of 463) for each of the creation modules works

2   substantially identically to each of the other modules to make the interface easy to use and

3   learn. The packager user interfaces forms a portion of the PDEI 400 shown on Figure 8. The

4   browse system 470 is entered first and allows viewing of records, and selection of specific

5   records. The database can be 'populated' by selection of a button, which activates a populate

6   screen. As represented at block 471, this allows details to be deleted, added or changed for

7   events, programs, and sources. The browse screen also allows access to the edit screen 472,

8   where fields in a selected record can be modified, with conflicts or errors, in scheduling for

9   example, being checked continuously, as at 473 and 474.

10   In use, the Operations Center 202 of the present invention performs a variety of

11   management functions which can be broken out into five primary areas: (1) cable headend 208

12   management, (2) program source management, (3) broadcast program management, (4)

13   internal program storage and management, and (5) marketing, management and customer

14   information. A relational database, such as that represented by Figure 10, can be used to

15   maintain the data associated with these areas.

16   Customer billing is not included in any of the above five areas for the Operations Center

17   202. Although billing can be handled by the Operations Center 202 (as shown in the database

18   structure 508, 511), it is preferred that billing is handled at a remote location through traditional

19   channels and methods (such as Cable TV billing provided by Telecorp corporation). Extracts

20   of customer purchases will be provided to the Operations Center 202. These extracts of

21   information will be formatted and correlated with customer demographics for marketing

22   purposes by the Marketing Information Interface (MII) 402.

23   (1)   Cable Headend Management

24   Management of the cable headend 208 includes the following activities: defining the

25   cable headend site; profiling the viewers; determining available set top equipment; defining the

26   concatenated cable systems connected to the cable headend site. This information may be

27   stored as cable franchise information within the Operations Center 202 database by the Cable

1   Franchise Information Access routine 404. Such information can be compiled and maintained

2   in a relational database (described below and shown as 328 in Figure 11).

3   (2)   <u>Program Source Management</u>

4   Source programs will be provided by a variety of networks. Information from the

5   contractual records to the actual program tapes should be maintained and includes: tracking

6   of property rights; tracking and profiling source tapes; profiling source providers. A relational

7   database (such as "D" shown in Figure 9) can be used, for example, that identifies and

8   correlates programs sources. Programs may be received from various rights holders, and such

9   a database would track the person or entity that owns the rights to each program at issue.

10   Other data could be maintained relating to program cuts (a program cut is a portion of a

11   program) that specifies, for example, the program from which the cut is taken. Information

12   relating to time slot allocations, menu entries, and categories, and channel assignments are also

13   maintained in the relational database.

14   Program services represents a purchasable time slice which is occupied by a type of

15   programming. Each time slice has multiple time constraints. Using the purchasing of through

16   time slices allows for great flexibility. An infinite number of program and time slice

17   combinations are possible. Preferably, services are created using the software shown in Figure

18   9, particularly the service creation routine 466. For a service to become available at a cable

19   headend 208 site, it is mapped to the site. At the time of mapping the program service is

20   assigned a program channel.

21   Program services are defined by the following fields:

22   Service ID   System generated unique ID

23   Description   Describes the service. The description will allow the packager to

24   easily assign a service to a broadcast program.

25   Type   Defines the type of service. Current service types include

26   YCTV™, Grid, Network and Other.

27   Network ID   Relevant for network services. (examples: ABC, NBC, DISC™)

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1	Broadcast Event	Relevant for a YCTV™ service. Identifies the current YCTV™
2		broadcast event assigned to the service.
3	PICON File	Name of the picture icon (PICON) assigned to the service. This
4		picon is displayed for example on the buy screen for a pay per
5		view event.
6	Expiration Date	Expiration date of the service. Removes the service from the
7		service selection list.
8	Day Start	Each service is a series of days within a week. This represents the
9		starting day (example: Monday).
10	Day Stop	Represents the last day in the interval.
11	Time Start	Within a day, the service has a time period. This field represents
12		the start of the period.
13	Time Stop	Represents the end of the time period.
14	Required Tape	If stored tapes are required, the number of tapes required by the
15		service.

16   (3)   Broadcast Program Management

17   Broadcast program management is one focal point of the data management system.

18 The issues of product, price, promotion and packaging are addressed at this level. Decisions

19 in these areas will affect the actual programming that will be shown to the viewers. Information

20 on description of the content of each program event, program scheduling, broadcast program

21 pricing, TV/set top information flow and information on how broadcast programs will be

22 mapped to viewer channels should be included in the database. Preferably, the EIS system

23 described below will access this data and assist in the Broadcast Program Management.

24   (4)   Internal Program Management

25   Information on internally stored programs at the Operations Center 202 should also

26 be maintained. This will allow the Operations Center 202 to assemble electronically stored

1   programs, CD stored programs and program tapes, and ensure the quality of programs and

2   location of programs.

3   (5)   Marketing And Customer Information

4   Last, and important, marketing and customer information should be maintained. In

5   order to effectively manage the operations, information is constantly needed on market

6   conditions. Information is needed on the existence of markets for certain programs. The

7   following type of information must be maintained in a Marketing and Customer Information data

8   base: demographic profile of viewers, viewer buy information; correlation of demographic

9   information with buy information, information rapid restructuring of program mix in response

10   to data analysis. As a subscriber uses the system, this viewer information or viewer log data

11   can be stored and maintained in relational database. The Marketing Information Interface 402

12   gathers the marketing information and indexes the information for inclusion in the Marketing and

13   Customer Information database. An example of the type of information that is needed in this

14   data base is a viewer profile.

15   The viewer profile data fields are an example of typical fields required in the databases.

16   Definitions of various fields are listed below. The primary purpose of profiling the viewer is to

17   acquire marketing information on the viewer's response to available selections. Ancillary

18   information will be available including the actual program and channel selections of the viewer.

19   Information tracked within the viewer's profile includes:

20   Viewer ID   A unique identifier generated by the system.

21   Set-Top Types   Boolean field which identifies the type of set top used.

22   Headend ID   Links the viewer to a particular cable site.

23   Site Assigned ID   Viewer ID assigned by the cable site.

24   Set-Top ID   ID of the viewer's set top.

25   Hookup Date   Date physical hardware is connected.

26   Survey Date   A demographic profile will be conducted on each user.

27   The following fields represent this demographic

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1		information. The data represents when the interview
2		survey was completed.
3	Viewers Age 2-5	Boolean field if the household has viewers between 2 and
4		5 years of age.
5	Viewers Age 6-11	Boolean field if the household has viewers between 6 and
6		11 years of age.
7	Viewers Age 12-17	Boolean field if the household has viewers between 12
8		and 17 years of age.
9	Tape Rental $	Approximate amount spent on tape rentals on a monthly
10		basis.
11	PPV $	Household average pay-pre-view expenditures per
12		month.
13	Income	Annual household income.
14	Zip Code	Self-explanatory.
15	Cable Tier	Level of cable service purchased.
16	Number of TV's	Self-Explanatory.
17	Years with Cable	Self-Explanatory.
18	Occupancy	Number of people in household.
19	Highest Education	Highest level of education of any member of the
20		household.

21   The compilation of viewer demographic information has an impact on decisions based

22   on marketing. The names of the heads of household are not used due to Privacy Act

23   considerations. Completion of demographic data can be accomplished referencing the cable

24   site assigned ID or the system generated ID. There are numerous variations to the field

25   definitions listed above such as different age groupings.

26   To maintain the database at the Operations Center 202, a data base server,

27   communications server, user work station or stations 262, or the suitable equivalent thereof,

1   are needed. The database server performs the following functions: it is the repository for data

2   base files, event logging, event scheduling (example, automated download of files to headends

3   208), multi-user services, data base server services, and data base security access.

4   The communications server performs the following functions on data base data:

5   integrity check, filtering, processing, downloading to headends 208, uploading from headends

6   208, and uploading from remote location.

7   User work stations 262 perform the following tasks: creation, deletion and access of

8   all database data, system administration and report generation. Database manipulations are

9   performed through the user workstations or remotely. The database structure is designed to

10   support multiple users performing multiple tasks simultaneously. The preferred embodiment

11   includes a network of user workstations 262. The workstations 262, through user interface

12   software, access data within database files on the database server.

13   For example, once the appropriate database data has been generated for downloading

14   to a cable headend 208, the communications server is instructed to perform the download.

15   Although this may be done manually at the communications server, it is preferred that the

16   communications server automatically send information to the cable headends 208. The

17   communications server retrieves required data from the database server, filters out any data not

18   associated with the specified headend 208, and performs data integrity checks, creates data

19   files to be downloaded and then downloads the data file via modem (or other devices such as

20   the DCPU 270). While the communication server is connected with the headend 208, it also

21   requests any data that the headend might be holding for the Operations Center 202. This may

22   consist of cable headend 208 event log information, set top billing and viewer log data on

23   programs watched, etc.

24   The communications server may also assist in retrieving information from other remote

25   sites such as remote billing and statistic sites. For example, if a location is being used for billing

26   purposes, the communications server may retrieve viewer log data. Also, the communications

27   server may retrieve billing and viewer log data from actual set top converters in the field. Once

1   the data is retrieved it is sent to the database server. Thus, in the preferred embodiment the

2   communications server will support incoming information via modem or otherwise.

3   The basic database structure at the Operations Center 202 consists of multiple tables.

4   Database data tables contain one or more data records, each with multiple fields. Each field

5   contains a piece of data about the particular record. This data may be general information,

6   such as a numeric value, date or text string, or it may be a reference to another database record

7   relating one piece of data to another. Database index files contain information about associated

8   data files to allow for improved data retrieval. The database index file makes retrieval of

9   information much quicker.

10   In an alternative embodiment where some television programming begins with the

11   procurement of source material in the form of tapes or CDs, additional data about the tapes or

12   CDs may be stored in the Operations Center database. Each tape or CD may have a database

13   record associated with it, source tape data file. Each tape may contain multiple cuts of which

14   each cut has an associated record in a source tape detailed data file. Additionally, a company

15   data file may contain individual records for the rights of the holders of the source tapes as well

16   as company information about cable headends 208. In this alternative embodiment with tapes,

17   programs may be created from multiple tapes using multiple tape source cuts. The programs

18   created by these source cuts may be stored and the individual cuts that make up the programs

19   may be stored in a database record called "program tape detail." Events may be created that

20   consist of more than one program and details on individual programs that make up these events

21   may be stored in a database file called "event detail." Using this embodiment, events may be

22   sold to subscribers.

23   Figure 10 and the description below is a more complete example of a database

24   structure that can be used with the present invention. Each database file is listed below along

25   with a description, record field details and explanation of relationships. The software data

26   structures are defined after the description of the database structure.

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1   The SCHEDULE Database file 501 contains scheduling data for a single day. There

2   are many schedule files, one for each day of schedule information. The actual filename for a

3   given days schedule is assigned under computer control. Schedules are broken up into single

4   days so they may be easily created, dispatched and archived. A cross-reference of days to

5   computer generated filenames is kept. Each scheduled event (either a program or a preview)

6   has its own record entry and unique schedule ID This record references the corresponding

7   scheduled program or preview and program type (either program or preview). The service to

8   carry the scheduled program is also referenced. The starting date and time is also specified.

9   Program duration is stored as a program attribute and is not included here. Note that program,

10   preview and service records must be provisioned before they may be referenced in a schedule

11   record.

12   Another SCHEDULE Database file 500 contains a cross-reference of starting dates

13   data to computer generated filenames.

14   The PROGRAM Database file 502 contains Program records are contained in another

15   database file 502, with each record representing a source program. Each program has a

16   unique program ID. If the program has a corresponding preview, it is also referenced.

17   Program category and price are also referenced. The structure of the program category

18   database may be modified if multiple categories per program are desired. Program name,

19   description and duration are also given. Note that preview, program category and price

20   category records must be provisioned before they may be referenced in a program record.

21   The SERVICE Database file 503 contains service records with each record

22   representing an available service. A service may be thought of as a virtual video channel.

23   Virtual channels are non-existent channels which are mapped or created by hardware and

24   software and is described in U.S. Patent Application Ser. No. 08/160,194, filed December 2,

25   1993, entitled ADVANCED SET TOP TERMINAL FOR A CABLE TELEVISION

26   DELIVERY SYSTEM, now U.S. Patent No. 5,990,927, incorporated herein by reference.

27   Services are then mapped into local headend channels. Since initial distribution of video source

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1   material may be by "Federal Express" instead of a video channel, a service ID is used to

2   identify the virtual channel being used for the desired service. "60 Minutes" could be

3   distributed and then be mapped into any desired local headend channel. The service database

4   exists at both the national site and at each local headend 208. Every service has a name, call

5   letters and a description of the service. Every service also has an assigned local channel, "A"

6   tape (or CD) machine ID and "B" tape (or CD) machine ID. Note that these last three

7   parameters only apply to the service databases at the local headends 208. The local headend

8   service database performs an equivalent function of a "channel map." For a further description

9   of the cable headend function, see U.S. Patent Application Ser. No.08/160,280, filed

10   December 2, 1993, entitled NETWORK CONTROLLER FOR A CABLE TELEVISION

11   DELIVERY SYSTEM, now U.S. Patent No. 5,600,364.

12   The PREVIEW Database file 504 contains preview records with each record

13   representing a source preview. A preview is like a program that is scheduled and distributed

14   over a service. It differs from a program in that multiple previews may be distributed over the

15   same service at the same time. Also, previews are free. Each preview specifies its location on

16   the TV screen. This is generally done by selecting from a menu of valid screen positions.

17   Unlike programs, previews do not reference program and price categories or other previews.

18   The PROGRAM CATEGORY Database file 505 contains program category records

19   with each record representing a valid program category. Examples of program categories are

20   movies, sports, educational and news. Multiple program categories per program may be

21   accommodated if desired with simple changes to the database structure.

22   The PRICE CATEGORY Database file 506 contains price category records with each

23   record representing a valid price category. Price categories are used to provide pricing

24   consistency throughout the system. It also provides flexibility at the headend 208 to price

25   various categories differently should this be desired. For example, distributed movies may be

26   assigned the price category "movie" at the national site. Each headend 208 could then charge

27   differing amounts for their movies by manipulating their local price category database. If a

1   current price structure needed to be changed, the change would be made once in the price

2   category database instead of in each program record.

3   The EVENT LOG Database file 510 contains event data for a single day. There are

4   many event files, one for each day of event information. The actual filename for a given days

5   events is assigned under computer control. Events are broken up into single days so they may

6   be easily archived. A cross-reference of days to computer generated filenames is kept.

7   Each event record contains a unique ID, an event code, ID of the process that

8   generated the event and date/time stamp of the event.

9   The EVENT LOG FILENAME Database file 507 contains a cross-reference of start

10   date to computer generated filenames.

11   The VIEWER LOG Database file 512 contains viewer log data for a single day. There

12   are many viewer log files, one for each day of viewer log information. The actual filename for

13   a given days viewer log data is assigned under computer control. Viewer log data is broken

14   up into single days so it may be easily archived. A cross-reference of days to computer

15   generated filenames is kept.

16   Each event record contains a unique ID, an event code, ID of the process that

17   generated the event and date/time stamp of the event. The Marketing Information Interface

18   402 accesses the VIEWER LOG Database file as necessary to retrieve "program watched"

19   information 420.

20   The VIEWER LOG FILENAME Database file 509 contains a cross-reference of date

21   to computer generated filenames.

22   The BILLING Database file 511 contains billing data for a single day. There are many

23   billing files, one for each day of billing information. The actual filename for a given days billing

24   data is assigned under computer control. Billing data is broken up into single days so it may

25   be easily archived. A cross-reference of days to computer generated filenames is kept.

26   Each event record contains a unique ID, an event code, ID of the process that

27   generated the event and date/time stamp of the event.

1   The BILLING FILENAME Database file 508 contains a cross-reference of start date

2   to computer generated filenames.

3   The NEWS FILENAME Database file 509 contains a cross-reference of date to

4   computer generated filenames.

5   The SET TOP Database file 517 contains set top converter records with each record

6   representing a unique set top converter. Each set top is assigned to a headend 208. Set-top

7   type, software version and serial number is also stored. Note that headend records must be

8   provisioned before they may be referenced in a set top record.

9   The HEAD END Database file 518 contains headend records with each record

10   containing headend 208 data specific to a single headend 208. Each headend 208 has a name,

11   contact name, address, phone number, modem information, time zone (relative to GMT) and

12   daylight savings time flag. This information may be stored in a separate database file called

13   Cable Franchise Configuration (shown as 328 in Figure 11).

14   The NATIONAL Database file 515 contains a single record containing national site

15   information. This includes site name, contact, modem information, time zone and daylight

16   savings time flag.

17   The CUSTOMER Database file 516 contains customer records with each record

18   containing customer data specific to a single customer. This includes personal information

19   (name, address, phone number, . . .) and assigned set top converter.

20   The TAPE MACHINE Database file 519 contains video tape or CD machine

21   information. Each machine is assigned a unique ID, its control port address, it's a/B switch

22   address (if present), its assigned service and an A/B assignment. This database is only located

23   at the headends 208.

24   The MESSAGE Database file 514 contains available system messages. They are

25   detailed in nature and are pre-programmed. Each message has an associated function. To

26   schedule a desired function, the appropriate message is referenced in the scheduler task list.

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1   The TASK Database file 513 contains scheduled tasks to be performed periodically.

2   It is used in conjunction with a scheduler process to control computer system functions such

3   as data dispatch and retrieval, archival and database maintenance. Each task is assigned a

4   unique ID, start time, stop time, period in minutes) and task type (single, periodic, round-robin).

5   Functions are actually scheduled by scheduling the appropriate message to be sent to the

6   appropriate process. Available messages are kept in a separate database. Note that these

7   messages must be provisioned before they may be referenced in a task record.

8   E.   System Operations

9   Figure 11 shows the basic operations that must occur in order for the packaged signal

10   to be sent to the satellite 206. External digital 280 and analog signals 282 must be received

11   from television programming sources and converted to a standard digital format by a converter

12   284, as described above. Also within the Operations Center 202, stored programs 286 must

13   be accessed using banks of looping tape machines or other video storage/retrieval devices,

14   either analog or digital, and converted to a standard digital format by the converter 284 prior

15   to use by the CAP 260.

16   The programmer or program packager utilizing the CAP 260 must input a variety of

17   information, including program information, in order to allow the CAP 260 to perform its

18   function of generating program control information and packaging programs. Some of the

19   information required by the CAP 260 are the date, time slots and program categories desired

20   by the television programmer.

21   The CAP 260 system includes one or more CPUs and one or more

22   programmer/packager consoles, together identified in Figure 4 as workstations 262. In the

23   preferred embodiment, each packager console includes one or more CRT screens, a

24   keyboard, a mouse (or cursor movement), and standard video editing equipment. In large

25   Operations Centers 202, multiple packager consoles 262 may be needed for the CAP 260.

26   As shown in Figure 12, the first step in the operation of the CAP 260 is selecting the

27   type of programming 300 which will be packaged. Basically there are six broad categories

1   in which most television programming can be classified: static programming 302, interactive

2   services 304, pay per view 306, live sports specials 308, mini pays 310, and data services

3   312. Static programs are programs which will show repetitively over a period of time such

4   as a day or week. Static programs include movies showing repetitively on movie channels,

5   children's programs, documentaries, news, entertainment. Program services, with defined

6   start and end time periods, behave like static programs and may be handled in a similar

7   manner.

8   Interactive services 304 typically include interactive programs using the Vertical

9   Blanking Interval (VBI) or other data streams synchronized with the programming to

10   communicate interactive features (such as those used in education), and games. Using this

11   feature, interactive home shopping programs are possible. Pay per view 306 are programs

12   which are individually ordered by the subscriber. After ordering, the subscriber is authorized

13   to access the program for a limited time, (e.g. three hours, two days, etc.). Live sports specials

14   are live events usually related to sports which subscribers are unlikely to watch on taped delay.

15   Mini pays 310 are channels to which existing set top converter boxes (not shown) and

16   the set top terminals 220 of the present invention may subscribe. The subscriptions for mini

17   pays 310 may be daily, weekly, or monthly. An example would be the Science Fiction

18   channel. Data services 312 are services in which information is interactively presented to the

19   subscriber using a modem or other high rate of speed data transfer. Some examples are

20   Prodigy, services for airline reservations, and TV guide services (e.g. TV Guide X*PRESS™,

21   InSight™, etc.). Data could also include classified or other forms of advertising.

22   The packager begins the CAP processing using the Packager Data Entry Interface

23   Software 400 and a workstation 262. After selecting the type of programming, the packager

24   must identify a pool of programs (within a category) to be packaged. The next CAP step

25   varies for different program categories. For the category of live sports 308, additional program

26   interstitial elements 314 such as promos and other sports news may be added before further

27   processing. For the live sports 308, static (or program service) 302, interactive services 304

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1   and pay per view 306 categories, the next CAP 260 step is for one television program to be

2   selected 316. This is followed by each program individually being assigned dates to be played,

3   a start date (for continuous play) and start times 318. Many dates and start times may be

4   assigned to any given program. Using this methodology, programs may be purchased by

5   viewers in time slices (e.g., one week). The program information for these categories may then

6   be processed for allocation of transponder space and setting of prices, as indicated at blocks.

7   320, 322, respectively.

8   Mini pays 310 and data services 312 require less processing by the CAP 260. After

9   identifying the mini pays 310, the CAP 260 may proceed to allocation of transponder space

10   and pricing, block 320, for the mini pays 310. Data services in the preferred embodiment

11   generally do not require allocation of transponder space and generally do not require price

12   setting. The information for data services 312 may be directly processed for menu

13   configuration, block 324. In alternate embodiments, the data services 312 may be processed

14   through these portions of the CAP 260 program.

15   The CAP 260 uses an interactive algorithm 416 to allocate transponder space 320 and

16   set prices 322. The factors weighed by the algorithm are: 1. buy rates of the program, 2.

17   margin of profit on the program, 3. length of the program, 4. any contractual requirement which

18   overrides other factors (such as requirement to run a specific football game live in its entirety).

19   The information on buy rates of the program may be obtained by the Marketing Information

20   Interface 400 from a Central Statistical and Billing Site, a Regional Statistical and Billing Site,

21   the cable headend 208 or directly from the set top terminals 220 as will be described later.

22   The CAP 260 must consider the priority levels of programming (e.g., Figure 16) when

23   allocating transponder space. Particularly, as in the preferred embodiment, transponders are

24   assigned to three specific priority levels. The CAP may automatically (without packager

25   intervention) access the MII 400 and the EIS to obtain necessary decision making information

26   on transponder allocation.

1   Following transponder allocation and price setting 320, 322, respectively, the CAP

2   260 proceeds to menu configuration 324. The positioning of programs within the menu

3   configuration 324 can have an effect on subscriber buy rates for the program. (The processing

4   of menu configurations 432 is also described in reference to Figure 8.) Therefore, an algorithm

5   accounting for either a manually assigned program importance or a calculated weight of the

6   program importance is used to determine each programs position within the menu scheme. For

7   instance, a popular program with a high profit margin may be assigned a high weight of

8   importance and shown in a prominent place in the menu scheme. Alternatively, a high profit

9   program with sagging sales may be manually assigned a prominent place in the program

10   schedule to increase sales.

11   After a series of entries by the programmer/packager at the Operations Center 202,

12   the CAP 260 displays draft menus 434 or schedules (including priority levels) for programming.

13   The packager may now manipulate the menus and schedules and make changes as necessary

14   436. After each change, the packager may again display the menus or schedules and determine

15   if any more changes are necessary 436. The packager may use the Executive Information

16   System with yield management as described below to assist in editing the menus and schedules.

17   When the packager is satisfied with the menu configuration 324 and scheduling of television

18   programs, the packager may then instruct the CAP 260 to complete the process.

19   After menu configuration 324, the CAP 260 may begin the process of generating a

20   program control information signal 326 (see also Figure 8 software description at 442 and

21   404). In order to generate program control information signals 326 which are specific to a

22   particular cable headend 208 system, the CAP 260 incorporates cable franchise configuration

23   information 328. In the preferred embodiment, unique cable franchise configuration information

24   328 is stored at the Operations Center 202. The cable franchises upload changes to their

25   specific franchise information 426 from time to time to the Operations Center 202 for storage

26   328. Preferably, a separate CPU (not shown) handles the management of the cable franchise

1   information 328. From the stored cable franchise information 328, the CAP 260 generates a

2   cable franchise control information signal 330 unique to each franchise.

3   Using the unique cable franchise control information signals 328 and the menu

4   configuration 324 information, the CAP 260 generates the program control information signal

5   276, as shown at function block 326. The program control information that is unique to a

6   particular cable franchise may be identified in various ways such as with a header. With the

7   header identification, the cable headend 208 may extract the portions of the program control

8   information signal 276 it needs. Now, the CAP 260 may complete its process by electronically

9   packaging the programs into groupings 280 for the signal transmission and adding the program

10   control information 276 to the packaged programs 334 to form a single signal for transmission.

11   Through manual entries by the packager (PDEI 400) or by comparing against a list of

12   programs, the CAP 260 will determine whether the programs are arriving from external sources

13   280 or sources internal 286 to the Operations Center 202.

14   Referring back to Figure 11, upon completion of the CAP's functions, the Operations

15   Center 202, or the uplink site 204 (Figure 1), compresses 288 (if necessary), multiplexes 290,

16   modulates 292 and amplifies 294 the signal for satellite transmission 296. In a basic

17   embodiment, the CAP 260 will also allow entry of time slots for local avails where no national

18   programming will occur.

19   Figure 13 is a more detailed flow chart 340 of some of the functions performed by the

20   CAP 260 after an initial program schedule has been entered and menu configurations

21   generated. This flow chart highlights that some of the functions described earlier in reference

22   to Figures 8, 9, 11 and 12 can be performed in parallel. The flow chart 340 shows six basic

23   functions that are performed by the CAP 260: (1) editing program schedule for local

24   availability 342 (only for non-standard services, i.e., those services that are not national cable

25   services); (2) generating program control information signals 344; (3) processing external

26   programs 346; (4) processing internal programs 348; (5) processing live feeds 350; and, (6)

27   packaging of program information 352. In an alternate embodiment, the CAP 260 is capable

1   of incorporating local programs and accommodating local availability for local television

2   stations.

3   Following completion of the programming scheduling (accounting for local availability

4   if necessary) and menu generation 342, the CAP 260 may perform three tasks simultaneously,

5   generating program information signals 344, processing external programs 346 and processing

6   internal programs 348.

7   The CAP 260 automatically identifies external programs feeds 356 and identifies which

8   external feed to request the external program 358. The CAP 260 gathers and receives the

9   external programming information 280, 282 (Figure 11) and converts it to a standard digital

10 format 360 for use. The CAP 260 also identifies internal programs 362 (and defined program

11 services), accesses the internal programs 364 (and program services), and converts them to

12 a standard digital format 366, if necessary. In addition, the CAP 260 identifies live signal feeds

13 368 that will be necessary to complete the packaged programming signal 370. In its last task

14 depicted in Figure 13 the CAP 260 completes the packaging of the programs and combines

15 the packaged program signal with the program control information signal 352, amplifies the

16 signal 354 and sends it out for further processing prior to uplink.

17 E.1. Menu Structure

18 The series of menus shown in Figure 22 is the normal or standard format for a variety

19 of alternative embodiments to the present invention. An introductory screen upon power up

20 that contains important messages, followed by a home menu 1010 with major programming

21 categories is the basis upon which many alternative embodiments of the menu driven selection

22 process can be built.

23 Skipping a sequence or level of the menu structure is possible and perhaps desired in

24 certain instances. In simple alternate embodiments it is possible to combine the home menu

25 1010 and introductory menu 1000 into one menu that performs both functions. It will be

26 obvious to one skilled in the art that the specific functions of the Home menu 1010 and

27 Introductory menu 1000 may be exchanged or shared in a number of ways. It is also possible

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1   to allow a user to skip directly from the introductory menu 1000 to a submenu 1050. This can

2   be accomplished most easily with a separate direct access remote control 900 button.

3   Generally, a subscriber will access a television program through execution of a submenu 1050.

4   The During program menus 1200 are enacted by the set top terminal 220 only after

5   the subscriber has selected a television program. These menus provide the subscriber with

6   additional functionality and/or additional information while he is viewing a selected program.

7   The During program menus 1200 sequence can be further subdivided into at least two types

8   of menus, Hidden Menus 1380 and Program Overlay Menus 1390.

9   To avoid disturbing a subscriber during viewing of a program, the Hidden Menus 1380

10   are not shown to the subscriber but instead "reside" at the set top terminal 220 microprocessor.

11   The Hidden Menus 1380 do not effect the selected program audio. The microprocessor

12   awaits a button entry either from the remote 900 or set top terminal 220 buttons before

13   executing or displaying any Hidden Menu options. The Hidden Menus 1380 provide the

14   subscriber with additional functions such as entering an interactive mode or escaping from a

15   selected program.

16   Program Overlay Menus 1390 are similar to Hidden Menus 1380 in that they occur

17   during a program. However, the Program Overlay Menus 1390 are overlayed onto portions

18   of the television screen and not hidden. The Program Overlay Menus 1390 allow the

19   subscriber to continue to watch the selected television program with audio but place additional

20   information on portions of the television screen. Most overlays cover small portions of the

21   screen allowing the subscriber to continue to comfortably view his program selection. Other

22   Overlays which are by their nature more important than the program being viewed will overlay

23   onto greater portions of the screen. In the preferred embodiment, some Program Overlay

24   Menus 1390 reduce or scale down the entire programs video screen and redirect the video to

25   a portion of the screen.

26   All menu entries may be made either from buttons available on the top cover of the set

27   top terminal 220 or from the remote 900.

1   Figure 23a shows the preferred embodiment for subscriber selection of television

2   programming. Figure 23b shows additional major menu 1020 categories, 1042, 1044, 1046,

3   1048, which may used with the invention. Again, the introductory menu 1000 followed by the

4   home menu 1010 is the preferred sequence of on-screen displays. In the preferred

5   embodiment shown in 23a, the home menu 1010 provides a choice of ten major menus 1022,

6   1024, 1026, 1028, 1030, 1032, 1034, 1036, 1038, 1040. Upon selection of a major menu

7   1020 category from the home menu 1010, the program proceeds to a major menu 1020

8   offering further viewer selections. Each major menu 1020 is customized to target the expected

9   viewership. Depending on the number of available program choices the major menus 1020

10   either breakdown the major category into sub-categories or provide the subscriber with access

11   to further information on a particular program.

12   For example, the major menu 1020 for children's programming provides a list of

13   subcategories 1052 from which the subscriber selects. Upon selection of a subcategory a

14   submenu 1054, 1056 listing program choices within that sub-category is shown to the

15   subscriber. Upon selection of a particular programming choice within the first submenu 1050,

16   the subscriber is then provided with a second submenu 1058 describing the program that the

17   subscriber has selected. From this menu, the subscriber may now confirm his program choice

18   and receive a confirmation submenu 1060 from the set top terminal 220 software.

19   Since the system utilizes digital signals in compressed format, High Definition Television

20   programming can also be accommodated through the menu system. In addition, since the set

21   top terminal 220 has two way communication with the cable headend, interactive television

22   programming is possible, with return signals generated by the set top terminal 220. Similarly,

23   the system can support "movies on demand" where a subscriber communicates through the set

24   top terminal 220 with an automated facility to order movies stored at the facility.

25   Using this on-screen menu approach to program selection, there is nearly an unlimited

26   number of menus that can be shown to the subscriber. The memory capability of the set top

27   terminal 220 and the quantity of information that is sent via the program control information

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1   signal are the only limits on the number of menus and amount of information that can be

2   displayed to the subscriber. The approach of using a series of menus in a simple tree sequence

3   is both easy for the subscriber to use and simply implemented by the set top terminal 220 and

4   remote control device 900 with cursor movement. A user interface software programmer will

5   find many obvious variations from the preferred embodiment shown.

6   Figures 24a and 24b show examples of introductory menu screens that are displayed

7   on the subscriber's television. Figure 24a, the preferred embodiment, welcomes the subscriber

8   to the cable system and offers the subscriber three options. The subscriber may choose regular

9   cable television (channels 2 through 39), programs on demand (e.g., movies), or instructions

10   on the use of the remote control 900. Other basic program options are possible on the

11   introductory menu screen 1000. For example, instead of, or in addition to, the remote control

12   900 instructions, a system "help" feature can be offered on the introductory menu 1000.

13   Fig 24b shows an alternate embodiment for the introductory menu screen 1000. In the

14   upper left-hand corner of the menu, there is a small window 1002 that may be customized to

15   the subscriber. A subscriber will be given the option of showing the current time in this

16   window. In the upper right-hand corner a second customized window 1004 is available in

17   which a subscriber may show the day and date. These windows may be easily customized for

18   subscribers to show military time, European date, phase of the moon, quote of the day, or other

19   informational messages. These windows may be customized by subscribers using on-screen

20   menu displays following the introductory menu 1000.

21   In the preferred embodiment, the subscriber is given the capability of accessing base

22   channels such as regular broadcast TV and standard cable channels directly from the

23   introductory menu 1000 by entering the channel number. The subscriber is also given the

24   capability of directly accessing his account with the cable company. Further, in the preferred

25   embodiment, the subscriber may directly access a major menu 1020 and bypass the home

26   menu screen 1010. If the subscriber is familiar with the programming choices available on the

27   major menus 1020, he may select an icon button 960, or a lettered key (alpha key) from his

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1   remote control 900 and directly access the desired major menu 1020. If any key entry other

2   than those expected by the set top terminal 220 software program is made, the home menu

3   1010 is placed on the television screen. In addition, after a period of time if no selections are

4   made from the introductory menu 1000, the program may default to the home menu screen

5   1010.

6   Figures 25a, 25b, 25c, and 25d are examples of home menus 1010 that may be used

7   in the set top terminal 220 software. Figures 25a-25d all employ multiple window techniques

8   to make the menu user friendly and offer a significant number of choices. It is preferred that

9   a channel line up and the major menu 1020 categories both appear on the home menu 1010.

10   Figure 25a, the preferred home menu 1010 embodiment, displays both the standard

11   channel line up and the programming on demand icons for selection by the subscriber. Figure

12   25a also shows various levels of subscription programming, including a "Basic" cable package

13   and a "Basic Plus" package. Each of the choices of subscription programming preferably is

14   assigned a different color. This increases the user friendliness of the present invention.

15   In Figures 25b-25d, the left half of the screen is used to list the channel number and

16   network abbreviation of the most popularly watched networks. The right half of the screen

17   offers access to a variety of major menus 1020 listed by category names.

18   Figure 25b shows an embodiment in which only eight major menus 1020 are utilized.

19   By pressing the alpha-numeric or icon key 960 corresponding to the category of programs the

20   subscriber desires, the appropriate major menu 1020 is accessed. In addition, the subscriber

21   may employ an on-screen cursor to select any option shown in the menu. To move the cursor,

22   the subscriber may use either the cursor movement keys on the remote control 900 or similar

23   keys located at the top of the set top terminal 220.

24   Figure 25c shows how additional major menus 1020 can be displayed on the home

25   menu screen 1010. When there is no longer room available for additional major menu 1020

26   choices on the home screen, the subscriber may access a second screen of the home menu

27   1010. For example, in Figure 25c, if additional major menus 1020 "J" through "Z" existed, the

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1   subscriber would access those menus by highlighting and selecting the J through Z menu

2   option(or press the J-Z on his remote 900). After selecting J through Z, the second or

3   extended home menu screen 1010 would appear on a subscriber's television set. This menu

4   would then list options J through Z separately by name. Theoretically, the home menu 1010

5   may have many extended home menu screens. However, any more than a few extended home

6   menu screens would confuse the average subscriber.

7   The home menu 1010 of Figure 25d adds an additional feature at the bottom of the

8   television screen 1011. This option allows a subscriber to see only those program selections

9   that are available on broadcast television. Figures 25a-d are but a few of the numerous

10 variations available for the home menu 1010.

11 Additionally, as shown in Figure 26, in an alternate embodiment, the home menu 1010

12 (or menu which would normally follow the introductory menu 1000) can be simply the standard

13 cable channel line-up. Offering the standard cable line-up on a separate menu may make

14 selection easier for viewers with small television screens.

15 Figures 27a and 27b are examples of major menus 1020. In particular, Figures 27a

16 and 27b show a major menu 1040 whose category is hit movies.

17 The hit movie category is a list of recently released movies which have been found to

18 be popular among movie goers. This movie list is changed once or twice a week to keep in line

19 with new movie releases. Again, multi-window and customized window techniques are utilized

20 to make the menu as user friendly as possible.

21 Figure 27a shows the preferred embodiment of the hit movies menu 1040. The hit

22 movies menu icon along with the hit movies category letter A are displayed. The current date

23 and time are displayed at the top of the screen over a menu background. Ten movie selections

24 are displayed in the center of the screen 1009, each in a box which may be highlighted when

25 selected. In the lower left part of the screen, a logo window 1512 is available as well as two

26 other option choices 1011, Movie Library and Return to Cable TV. In an alternate

1 embodiment, the return to Cable TV option is changed to return to the Home menu 1010 (or

2 return to other viewing choices).

3 In Figure 27b, the left upper window 1002 displays current time and the right upper

4 window 1004 displays a message. This menu provides a list of eight movie titles and their

5 rating 1009. If the subscriber desires further information on any particular movie he may select

6 a movie using the cursor movement buttons and press the "go" button on the remote control

7 900 or set top terminal 220 box.

8 It is important in creating user friendly interfaces that the menus are consistent and

9 follow a pattern. A manner of making the menus is discussed below with respect to Figures

10 55 and 56. This consistency or pattern between the different menus provides a level of comfort

11 to the subscriber when encountering new menus. In the major menu 1020 example of Figure

12 27a, the upper sash 1502 and lower sash 1504 remain consistent throughout menus in the

13 preferred embodiment. The logos 1508, icons 1510 and titles also remain consistent in the

14 same locations.

15 In the major menu 1020 example of Figure 27b, the customized windows 1002, 1004

16 in the upper corners remain constant from menu to menu. Also, the name of the menu and

17 category are at the top and center of the menu screen 1039. To make the menu aesthetically

18 pleasing, the instructions are given across the center of the screen and choices in large legible

19 type are provided. Additionally, at the bottom of most menu screens 1011, the subscriber is

20 given the option of returning to regular TV or returning to the home menu 1010.

21 Figures 27c-27g show alternative embodiments of major menus 1020 for the home

22 menu shown in Figure 25a. Figures 27c-27g show various major menus directed to the type

23 of subscription services available (basic service 1420, basic plus 1422, economy package

24 1424, ala carte and premium channels 1426). These menus also provide promotional or

25 advertising information, for example, the cost for the particular subscription service. Figure 27g

26 shows a major menu for the Learning Channel 1428, one of the individual channels shown in

27 the home menu of Figure 25a.

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1   These menus may be grouped in similar colors or shades of colors. For example, the

2   basic subscription service could have a light pink color. As the subscription services increase

3   in terms of the number of channels available, the color shading may increase correspondingly.

4   Therefore, the premium subscription service (ala carte service) would have a dark red color,

5   contrasting with the light pink color of the basic subscription service.

6   In Figure 27b, the movie titled <u>Terminator 4</u> is highlighted, signifying that the

7   subscriber has chosen this program option from the hit movie major menu. Figures 28a and

8   28b show submenus 1050 which would follow the selection of <u>Terminator 4</u> on the hit movie

9   major menu. In Figure 28a, the sash across the top of the screen 1502 remains constant from

10   major menu 1020 to program description submenu 1050. Again in Figure 28b, for the comfort

11   of the subscriber, the left upper window 1002 remains the same and shows the current time.

12   The upper right-hand corner 1004 carries a message stating the next start time for the movie

13   selected.

14   E.2. <u>Notification</u>

15   Figures 29a and 29b are notification submenus informing the user that his program

16   selection is about to begin (e.g., counting down until start time). Using this submenu, the set top

17   terminal 220 warns the user prior to switching him away from the channel he is viewing to a

18   prior selected program channel. This notification submenu is provided to the subscriber

19   approximately one or more minutes before the set top terminal 220 changes the viewing

20   channel.

21   Both notification submenu examples allow the subscriber to cancel his movie order.

22   In Figure 29a, the subscriber is notified in the center of the screen that he may cancel within the

23   first five minutes. In Figure 29b the subscriber may press escape to cancel his order without

24   charge. The notification submenu of Figure 29b informs the user of the start time at the upper

25   right portion of the screen.

26   The notification submenu of Figure 29b is a simple three-window menu. A strip

27   window at the top of the screen 1103 notifies the subscriber of the movie selected and the

1   amount of time before the movie will begin. The center window is a large video window 1556

2   for displaying a scene from the movie. At the bottom of the screen the submenu carries another

3   strip menu 1105 which informs the user that he may escape from his program selection without

4   charge.

5   Using a notification submenu 1127, the set top terminal 220 may allow a subscriber to

6   view other programs prior to his movie start time. The subscriber is amply notified of the start

7   time of his program and effortlessly moved to the correct channel to view his selected program.

8   This notification-type submenu may be used to move a subscriber from his current channel to

9   any preselected channel for viewing a program which has been ordered at an earlier time. In

10   the preferred embodiment, the amount of time provided by the notification submenu may be

11   customized by the subscriber to a length of his preference. The notification submenu also

12   allows a subscriber to cancel or escape from his previously selected program choice and avoid

13   any charges. If a subscriber cancels or escapes he is returned to the channel that he is currently

14   watching.

15   E.3. Escape Time Expired

16   As shown in Figure 30a, in the preferred embodiment, the subscriber is given a During

17   Program Menu, specifically an Overlay menu 1130 to inform him when his five minutes of

18   movie escape time have expired. Once the time has expired the subscriber will be billed for

19   the movie selection.

20   E.4. Escape After Charged

21   Figure 30b is an overlay menu 1133 warning the user that he is escaping a program

22   after being charged for the order of that program. The warning overlay menu 1133 of Figure

23   30b follows in sequence and is prompted by a hidden menu which constantly monitors for

24   subscriber input during viewing of the program. The hit movie hidden menu (not shown)

25   specifically waits for certain key entries by the subscriber. In particular, the hit movie hidden

26   menu awaits for a key stroke such as escape, cancel or an icon selection. If the escape button

27   is depressed during the viewing of a hit movie the overlay menu of Figure 30a or Figure 30b

1   will be shown. A strip menu in the lower sash of Figure 30b allows the subscriber to resume

2   full screen viewing of the hit movie.

3   Figure 30b is a representative example of an overlay menu 1133. It has a dark lower

4   background sash and a light colored informational sash. The upper portion of the screen

5   continues to display the video of the program selected. Figure 30c is a reentry to ordered

6   selection submenu 1135 for the hit movie category. The reentry to ordered selection submenus

7   appear whenever a subscriber selects a programming option (program, event, or subscription

8   channel), that the subscriber has already ordered. This menu has a program title window with

9   a text title entry, and a description of the order that has already been placed for the program

10   (or channel). In the preferred embodiment, the submenus which allow reentry to ordered

11   selection provide the subscriber with the added option of joining the program within any fifteen

12   minute interval. This special feature of the preferred embodiment allows a subscriber who has

13   viewed one-half of a particular program to rejoin the program at the half-way point. In this

14   manner, the program delivery system mimics a VCR tape recording of the program. For

15   example, if a subscriber had rented a videotape of the movie Terminator 4 and had

16   watched thirty minutes of the movie, he would have left his videotape in the thirty minute

17   position.

18   E.5. <u>Reenter Program</u>

19   With the menu of Figure 30c a subscriber to the system who has watched thirty minutes

20   of Terminator 4 may reenter the Terminator movie at the thirty-one to forty-five minute interval

21   as shown in Figure 30c. The nine-fifteen minute blocks of the menu display blocks are

22   representative of the choices available for a two-hour hit movie. Other variations are possible

23   depending on the length of the movie and the timing intervals desired.

24   E.6. <u>HDTV Promotion</u>

25   Figures 31a and 31b relate to HDTV. Figure 31a is an example of a menu 1032

26   advertising a new feature of the system. Promotional menus, such as Figure 31a, may be

27   dispersed throughout the menu driven program selection system. This particular menu

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1   describes the HDTV feature and explains its unavailability until a future date. Figure 31b shows

2   the integration of HDTV services into the menu driven program delivery system. If the

3   subscriber selects the major menu for HDTV, he will either receive a description of the service

4   with a suggestion to order the system, or a text note that he is a current subscriber and a listing

5   of the currently available program selections in HDTV 1232. If the subscriber has not paid to

6   join the particular service, HDTV, he may be allowed to join one of the programs in progress

7   for a limited time as a demo to entice the subscriber to order.

8   If the subscriber has paid his HDTV fees, a subscriber proceeds as he would in any

9   other major menu screen.

10   This particular major menu shows an example of how a follow-on or second screen

11   may exist for the same menu. In this particular case, a second screen exists for the major menu

12   HDTV 1032. The subscriber may access the second screen 1232 by selecting the last menu

13   display block in the lower part of the screen "Other HDTV Selections". Following this

14   selection, the subscriber will be given a second screen of program selections. In this manner,

15   any menu can have multiple screens with many program choices. This type of screen pagination

16   on one menu allows the packager to avoid categorizing program selections within that same

17   menu. In an alternative embodiment, the options available to the subscriber may be scrolled

18   on one menu screen with the text within the menu display blocks changing as the subscriber

19   scrolls up or scrolls down.

20   E.7. Programs Available

21   In the preferred embodiment, TV guide services, listing programs available on network

22   schedules, will be available on a major menu, as shown in Figure 32a. In the preferred

23   embodiment, the major TV guide menu 1036 would offer submenus, such as network

24   schedules for the next seven days, today's network schedules for the next six hours, and TV

25   guide picks for the next seven days. If the particular set top terminal 220 has been subscribed

26   to the TV guide service, the subscriber may proceed to a submenu showing schedules of

27   programs. If the subscriber chooses the network schedule submenu 1236, he is offered a list

1   of network schedules to choose from as shown in Figure 32b. If a subscriber were to choose,

2   for instance, HBO, the submenu 1238 shown in Figure 32c would appear. This submenu

3   allows a subscriber to choose the program date that interests him. Following selection of a

4   date, the subscriber is shown a more specific submenu 1242 listing programs available on the

5   particular date as shown in 32d.

6   Following a program choice, a program description submenu 1244 is placed on the

7   television screen as shown in Figure 32e. In addition, from this program description submenu,

8   the viewer may choose to record the selected program on his VCR using the guide record

9   feature. If the guide record feature is chosen, the guide record submenu 1248 shown in Figure

10   32f provides the subscriber with further instructions. In order for the set top terminal 220 to

11   perform the guide record functions and operate the VCR, control signals must be sent from the

12   set top terminal 220 to the VCR via the video connection 650 or via a separate connection

13   between the set top terminal 220 and the VCR. The VCR must be capable of interpreting

14   these control signals from the set top terminal 220 and performing the desired function (such

15   as, activating the record feature). In the preferred embodiment, the VCR control signals are

16   sent with the video signal and output from the output 650, as described above.

17   Figures 32g and 32h refer to the broadcast TV menu option available in Figure 23b.

18   Figure 32g is a major menu 1046 displaying subcategories of programs available on a group

19   of channels called generically "broadcast TV." For each subcategory there is a separate

20   submenu listing programs that are available in the particular subcategory on a group of channels

21   called broadcast TV.

22   By using the broadcast TV menu, the subscriber does not need a written guide of

23   available television programming on the major networks. Although the preferred embodiment

24   categorizes television programs available on the major networks, a simple chronological listing

25   of programs may also be used.

26   Following a subcategory selection on the broadcast TV menu such as favorite channels,

27   the set top terminal 220 will display a submenu of programs as shown in Figure 32h. The

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1 favorite channel program menu 1256 of Figure 32h allows the subscriber to choose among

2 eight programs in progress at 9:45 p.m. on a broadcast TV network.

3   Using this methodology, the subscriber may also be allowed to choose among

4 television programs which will be available for viewing in the next half hour or hour. When the

5 time of the preselected program is approaching, the set top terminal 220 will display a

6 notification menu or window to the subscriber (similar to Figure 29a and 29b) informing him

7 of an eminent change of channels to a previously selected program.

8   E.8. Mood Questions

9   Once a personal profile has been created (in a particular set top terminal 220), it can

10 be indefinitely stored in nonvolatile memory. A selection at the home menu screen 1010

11 activates the program selection feature. Following activation of the feature, the set top terminal

12 220 will present the viewer with a series of brief questions to determine the viewer's mood at

13 that particular time. For example, the first mood question screen 1260 may ask the viewer to

14 select whether he desires a short (30 minute), medium (30-60 minute), or long (60 plus minute)

15 program selection, as shown in Figure 32i. The second mood question screen 1262 requests

16 the viewer to select between a serious program, a thoughtful program, or a light program, as

17 shown in Figure 32j. And the third mood question screen 1264 requests whether the user

18 desires a passive program or an active program, as shown in Figure 32k. The viewer makes

19 his selection in each question menu utilizing the cursor movement keys and "go" button on his

20 remote control 900. A variety of other mood questions are possible such as fatigue level of the

21 viewer.

22   After the viewer has responded to the mood question menus which determine his

23 mood, the set top terminal 220 finds the best programming matches for the viewer and displays

24 an offering of several suggested programs to the viewer (three or more programs are preferred)

25 . The matching algorithm compares the viewer profile data with information about the program

26 derived from the program control information (or STTCIS) signal, such as show category,

27 description type, length, etc. Using the personal profile information and mood questions

1   suggested above, the following types of outcomes are possible. If the set top terminal 220 is

2   presented with a young lady viewer, educated in Boston who watches sitcoms on a regular

3   basis, and desires a short, light, passive program, a match might be found with the 30-minute

4   sitcom Cheers, the sitcom Designing Women, and Murphy Brown. Taking another example,

5   a middle-aged male viewer from the Boston area, wishing a longer length, light, passive

6   program suggestion might be suggested the New England Patriots game, the Boston Red Sox

7   game and a science fiction movie.

8   With this program selection feature, the set top terminal 220 can intelligently assist the

9   specific viewer in selecting a television program. Instead of the set top terminal 220 requiring

10   an input of personal profile information, the terminal may also "learn" a subscriber's viewing

11   habits by maintaining historical data on the types of programs the viewer has most frequently

12   watched. This information can then be fed to the matching algorithm which selects the

13   suggested television programs.

14   Using this methodology, it is even possible for the set top terminal 220 to suggest

15   programs for two viewers. By using two sets of viewer profile information, the matching

16   algorithm can find the best match for joint viewing. For example, the set top terminal 220 can

17   suggest programs for a couple watching television simultaneously.

18   E.9. Promotions

19   Figures 33a, 33b, and 33c demonstrate the use of promotional menus to sell

20   subscriptions to services in the system. In particular, Figure 33a is a promotional menu 1304

21   for Level A interactive services. Level A interactive services offers subscribers additional

22   information about programs such as quizzes, geographical facts, etc. This information may be

23   received by the set top terminal 220 in several data formats including VBI and in the program

24   control information signal. Figure 33b is a promotional menu 1306 for Level B interactive

25   services which include a variety of on-line type services such as Prodigy, Yellow Pages, Airline

26   Reservations, etc.

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1   Figure 33c is a promotion menu 1308 for the Level C interactive services. The Level

2   C interactive services utilize local storage such as CD technology to offer an enormous range

3   of multi-media experiences. The Level C interactive services require a hardware

4   upgrade as described earlier. Specially adopted CD-I and CD-ROM units are needed for

5   this service.

6   E.10. Level A Interactive

7   Figures 33d through 33j show menus that are available using the interactive Level A

8   services. When interactive Levels A services are available in a television program, the system

9   will display the interactive logo consisting of the letter "I" and two arrows with semicircular tails.

10   In the preferred embodiment the set top terminal 220 will place the interactive logo on the

11   television screen as an overlay menu 1310. In the preferred embodiment, the set top terminal

12   220 will detect that there is data or information available about a television program which can

13   be displayed to a subscriber using the interactive service. When the set top terminal 220 senses

14   that there is interactive information available, it will generate the interactive logo overlay menu

15   and place it on the television screen. For example, the set top terminal 220 will detect that

16   information on a television program is being sent in the vertical blanking interval (VBI) and

17   generate an interactive logo overlay menu which will appear on the subscriber's

18   television screen for approximately fifteen seconds during each ten minute interval of

19   programming.

20   When the subscriber sees the interactive logo on his television screen, he is made

21   aware of the fact that interactive services are available in conjunction with his television

22   program. If the subscriber presses his interactive remote control button, an additional overlay

23   menu will be generated by the set top terminal 220 and placed on the screen. This menu 1310

24   is shown in Figure 33d being overlayed on an interactive television program. From this menu

25   the subscriber may select interactive features or return to the television program without

26   interactive features.

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1   If the subscriber selects interactive features he will be presented with the interactive

2   Level A submenu 1312 in Figure 33e. From this submenu the subscriber may choose a variety

3   of different types of textual interactivity with the current television program. Some examples

4   are quizzes, fast facts, more info, where in the world, products, etc. At any time during the

5   interactive submenus the user may return to the television program without interactive features.

6   This interactive submenu has an example of taking a complete television program

7   video, scaling it down to a smaller size and directing the video into a video window of a

8   submenu.

9   Figure 33f shows an interactive fast facts submenu 1314. In this submenu textual

10 information is given to the subscriber in the lower half of his screen. This textual information

11 will change as additional data is received by the set top terminal 220 relating to this television

12 program.

13 Figure 33g shows the use of the subcategory "more information" in the interactive

14 service. This submenu 1316 gives additional information related to the television program to

15 the viewer in textual form in the lower half of the screen. Figure 33h is an interactive submenu

16 1318 for the subcategory "quiz." In this interactive subcategory, the user is presented with

17 questions and a series of possible answers. If the subscriber desires, he selects one of the

18 answers to the quiz question. After his selection, the set top terminal 220 sequences to another

19 menu. The set top terminal 220 sequences to the interactive quiz answers submenu which

20 informs the subscriber whether he has chosen the correct answer or not. Figure 33i shows a

21 correctly answered quiz question 1320 and Figure 33j shows an incorrectly answered quiz

22 question 1324. In the preferred embodiment, the menu graphics for both of these menus 33i

23 and 33j is the same. The only difference is in the text which can be generated by the text

24 generator of the set top terminal 220.

1   E.11. <u>Level B Interactive</u>

2   Figure 34a is an example of a submenu for Level B interactive services. From this

3   menu screen 1330, any of a number of on-line data services could be accessed. In Figure 34a,

4   the airline reservations selection has been selected by the subscriber.

5   E.12. <u>On-Line Data</u>

6   Figures 34b through 34l provide an example of a sequence of menus that a subscriber

7   may encounter with an on-line data service. In particular, this example relates to airline

8   information and reservations and the subscriber in this sequence is reserving and purchasing

9   airline tickets. Figure 34b is an example of the first submenu 1332 for a data service offering

10   various options. In this case, the subscriber has the option of checking current reservations or

11   making new reservations. In each of these submenus related to a data service, the subscriber

12   is able to return to the home menu 1010 or regular cable TV and exit the data service. Figure

13   34c requires the subscriber to enter information related to his airline reservation in this submenu

14   1334, such as: domestic or international flight, year of flight reservation, month of flight

15   reservation.

16   Figure 34d is another submenu in the airline information and reservation data service.

17   Figure 34d provides an example of how the subscriber may choose among many options on

18   a single screen 1336. In this manner, the preferred embodiment of the system can avoid the

19   use of a separate keyboard for textual entry. Although a separate keyboard may be provided

20   as an upgrade, it is an added expense which some subscribers may wish to avoid. Figure 34d

21   shows an "eye off the remote" approach to entering information. Figure 34d allows the user

22   to chose the State in which he will depart and the state in which he will arrive. The airline

23   information reservation submenu 1338 shown in Figure 34e allows a subscriber to choose the

24   airports from which he will depart and arrive and also the approximate time period of his

25   departure and his arrival. Figure 34f, an airline information and reservation submenu 1340,

26   allows a subscriber to view six available flights. A subscriber may select one of the flights to

27   check on its availability.

1   Figure 34g, an airline information and reservation submenu 1342, allows a subscriber

2   to enter the month, day and year for the availability date he desires. In this submenu, the

3   subscriber is offered the option of correcting any errors in the entered information. This

4   particular submenu is for a particular flight, including flight number.

5   Figure 34h, an airline information and reservation submenu 1344, allows a subscriber

6   to view remaining seats available on a flight. From the menu, the subscriber may select his seat

7   assignments. This submenu is an example of how information may be graphically shown to a

8   subscriber using a portion of the menu and different coloring schemes. In this menu, the lower

9   half of the screen shows the passenger compartment of an airplane with all the seat locations

10   graphically represented by square blocks. By coloring the available seat locations in blue and

11   the unavailable seat locations in a different color, the menu can present a great deal of

12   information in a limited amount of space. This graphic presentation of information for the

13   interactive on-line data services is an important method of visually displaying large amounts of

14   information to the subscriber.

15   Figure 34i, an airline information and reservation submenu 1346, allows the subscriber

16   to choose a one-way or round-trip ticket and to confirm his reservations. If the subscriber

17   desires to proceed, he may charge his airline ticket to his credit card by choosing the

18   appropriate strip menu on the lower part of the screen.

19   Figure 34j, an airline information and reservation submenu 1348, is an example of how

20   credit card purchases may be made using the interactive on-line data services. In this particular

21   menu, the subscriber is charging a round-trip plane ticket on his credit card. The subscriber

22   simply needs to enter his credit card number, expiration date, and credit card type to charge

23   his airline ticket.

24   Figure 34k, an airline information and reservation submenu 1350, is an example of a

25   menu which may be shown whenever an on-line data service is processing a request sent by

26   the subscriber. In this particular menu, the on-line data service is processing the subscriber's

27   credit card charge for his airline ticket.

1   Figure 341, an airline information and reservation submenu 1352, confirms a

2   subscriber's airline ticket purchase and passes on information on where the ticket may be

3   picked up.

4   E.13. Digital/Audio Program Choices

5   Figure 35a is a major menu 1038 displaying the digital/audio program choices which

6   are available for subscribers who have paid the monthly fee. In a chart format, the major menu

7   shows the top five, top ten, and top forty songs available in six different categories of music.

8   Below the chart, the system is able to provide a text message describing the particulars of the

9   audio program selected.

10   The digital/audio feature of the invention allows a subscriber to listen to CD quality

11   audio selections through his stereo. This can be accomplished by running cables directly from

12   the set top terminal 220 to the subscriber's amplifier/stereo system. Alternatively, the user may

13   listen to audio selections through his television system.

14   Figures 35d and 35e are the same major menu 1038 as Figure 35a but shows a

15   different selection and a different program description in the lower text 1408, 1412. From any

16   of the menu screens for the digital/audio feature, the subscriber may return to regular cable TV

17   with the press of a single button.

18   Figures 35b and 35c are promotional menus 1400, 1404 for the digital/audio feature.

19   Using the same logos and menu format, the system can provide a text description enticing the

20   subscriber to pay the monthly fee and join the service. In Figure 35b, the menu allows the user

21   to test the system with a free demonstration. The menu in Figure 35c allows the subscriber to

22   request additional promotional information about the system. Both Figures 35b and 35c are

23   representative of promotional menus that may be used throughout the menued system.

24   E.14. Monthly Account Review

25   Figures 36a, 36b and 37a, 37b relate to the monthly account review capabilities

26   available to the subscriber. In the preferred embodiment, the subscriber may choose to access

27   the monthly account review capability from both the introductory menu 1000 and home menu

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1   1010. The monthly account review screen shows alternative window types that are available

2   to the set top terminal 220. For example, in the upper left-hand corner of the monthly account

3   review, the current time and date are both shown. The upper right-hand corner provides the

4   subscriber with instructions on how to use the monthly account review capability. Figure 36b

5   also shows that windows may be created in a variety of shapes. For instance, on the lower

6   right-hand part of the screen 1612 two triangularly shaped windows with messages are shown.

7   In addition, on the left lower part of the screen 1612 a window in the shape of a trapezoid is

8   shown with a textual message inside.

9   The monthly account review provides a list of charges from the first day of the month

10   to the date of viewing for each major menu. Charges are incurred on a pay-per-view basis

11   and on a subscription basis (weekly, monthly, quarterly, etc.).

12   At the lower part of the screen, the total of the charges incurred for the month is listed. The

13   account status can also be calculated on a weekly, quarterly or semi-annual basis.

14   If the user moves his cursor to highlight one of the eight menus listed and depresses the

15   "go" button, he will obtain further billing information on the menu. Figures 36a and 36b show

16   in screens 1610 and 1612, respectively, the subscriber selecting menu A for further information.

17   Figures 37a and 37b are submenus for the monthly account review and displays

18   detailed billing information about selections made on menu A. The date of each movie

19   selection, title of the movie, and price for each movie is displayed (1614, 1616). Also, any

20   discounts which have been granted are displayed. The total charges on this menu and the day

21   in which the menu will be changed are shown in the lower part of the screen. From this

22   submenu, the subscriber may either return to regular TV or return to the major menu for the

23   monthly account review. If the submenu information does not fit on a single screen, an

24   extended submenu may be utilized with follow on extension screens. Alternatively, a scrolling

25   feature may be used enabling the subscriber to scroll additional information onto the first

26   submenu screen.

1   The account information necessary to create the monthly account review menus may

2   be stored either in the memory of the set top terminal 220 or at a remote location that

3   communicates with the set top terminal 220. In the simplest embodiment, the set top terminal

4   220 records a subscriber's selections locally and calculates the monthly account review based

5   upon the subscriber's selections which require the payment of fees. This monthly account

6   information is stored locally and sent to the cable headend 208 at least once a month for back-

7   up and billing purposes.

8   Alternatively, the subscriber's viewing selections and billing information may be

9   continuously maintained at the cable headend 208 or a remote site connected via

10   communication lines to the cable headend 208. The cable headend 208 or the remote site must

11   regularly transmit the monthly account information to the set top terminal 220. Each

12   embodiment has advantages and disadvantages. If the account information and processing is

13   done locally at the set top terminal 220, each set top terminal 220 must be provided with the

14   memory and necessary processing capability to maintain the account. This greatly increases

15   the cost of a set top terminal 220. If the account information is maintained remotely, the remote

16   site must remain in regular contact with the set top terminal 220 in order to provide the

17   subscriber with billing information.

18   To accommodate homes with multiple viewers two or more set top terminals 220 may

19   be placed on a single bill or two accounts may be created for one set top terminal 220.

20   F.   Allocation of Cable System Bandwidth

21   One of the primary tasks of the Operations Center 202 is, with assistance from the

22   cable headends 208, effective utilization of available bandwidth from the Operations Center

23   202 to the subscriber homes. Figure 14 shows effective allocation of 750 MHz of bandwidth

24   (1 MHz to 750 MHz) for television programming. In Figure 14, bandwidth is allocated for both

25   analog 226 and digitally compressed 227 signals. In the preferred embodiment, the bandwidth

26   is divided so that each category of programs receives a portion of the bandwidth. These

27   categories correspond with major menus of the set top terminal software. The representative

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1   categories shown in Figure 14 include: (1) high definition TV (HDTV) made possible through

2   the use of compression technology, (2) A La Carte Channel category which provides specialty

3   channels for subscription periods such as monthly, and (3) pay-per-view.

4   Figure 15 shows a chart 228 of compressed channel allocation for a variety of

5   programming categories 229 that have been found to be desirable to subscribers. By grouping

6   similar shows or a series of shows into blocks of channels 230, the system 200 is able to more

7   conveniently display similar programming with on-screen television menus. For example, in the

8   movie category, which has the greatest allocation of channels, the same movie may be shown

9   continuously and simultaneously on different channels. Each channel starts the movie at a

10   different time allowing the subscriber to choose a more suitable movie starting time (e.g., every

11   15 minutes).

12   In order to accommodate cable TV systems that have different bandwidths and channel

13   capacities, the television programming and television program control information may be

14   divided into parts such as priority one, two and three. The large bandwidth cable TV systems

15   can accommodate all the parts of the television programming and all parts of the television

16   programming control information. Those cable TV systems with a more limited bandwidth are

17   able to use the program delivery system 200 by only accepting the number of parts that the

18   cable system can handle within its bandwidth.

19   For instance, as is shown in Figure 16, three cable television systems with different

20   bandwidths may use the program delivery system 200 simultaneously with each system

21   accepting only those parts of the information sent which it is capable of handling. Priority one

22   television programming and menus 240 are accepted by all three systems. Priority two

23   television programming and menus 242 are not accepted by the cable television system whose

24   capacity is the smallest or in this case 330 MHz (40 channels) system. Priority two television

25   programming and menus 242 are accepted and used by the two larger capacity cable television

26   systems shown. Priority three television programming and menus 244 are only used by the

1   largest capacity television system which is capable of handling all three parts -- Priority one,

2   two and three programming and menu information.

3   With this division of television programming and menus, the program delivery system

4   200 may be utilized simultaneously by a variety of concatenated cable systems 210 (depicted

5   in Figure 1) with varying system capacities. By placing the heavily watched or more profitable

6   programming and menus in the priority one division 240, both users and owners of the cable

7   TV systems will be accommodated as best as possible within the limited bandwidth.

8   Figure 17 shows three different cable headend 208 systems, each system receiving the

9   entire satellite signal from the Operations Center 202 and stripping those parts of the signal

10   which cannot be handled by the local cable system due to bandwidth limitations. In this

11   particular embodiment, the three local cable television systems shown have bandwidth

12   limitations which correspond with the bandwidth limitations depicted in the previous Figure 16.

13   As the bandwidth decreases, the programming options available to the viewer in the exemplary

14   on-screen menu decreases. Using this preferred embodiment, the Operations Center 202 is

15   able to send one identical signal to the satellite 206 that is sent to all the cable headends 208.

16   Each cable headend 208 accepts the entire signal and customizes the signal for the local cable

17   system by stripping those portions of the Operations Center signal that are unable to be handled

18   by the local cable system. An alternate embodiment (not shown) requires the Operations

19   Center 202 (and uplink sites 204) to send different signals for reception by different capacity

20   cable headends 208.

21   There are several ways in which a cable headend 208 may strip the unnecessary signal

22   from the Operations Center 202. A person skilled in the art will derive many methods from

23   the three examples discussed below. The first method is for the signal originating from the

24   Operations Center 202 (and uplink site 204) to be sent in portions with each portion having a

25   separate header. The respective cable headend 208 would then recognize the headers and

26   transmit to the concatenated cable system 210 only those signals in which the proper headers

27   are identified. For example, using three concatenated cable systems shown in Figure 17, the

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1   headers may be "001," "002," and "003." A wide bandwidth concatenated cable system can

2   accept program signals with all three headers, while the narrowest bandwidth concatenated

3   cable system may only be able to accept signals with a "001" header. For this first method, a

4   central Operations Center 202 must divide the program signal into three parts and send a

5   separate leading header before each signal for each part. This method requires has the

6   additional signal overhead of a header on the program signal. The header would be transmitted

7   from time to time as necessary.

8   A second method requires a set of transponders to be assigned to each priority level

9   and the cable headend 208 to route signals from the transponders corresponding to the proper

10 priority level for the concatenated cable system 210. For example, if there are three priority

11 levels and eighteen transponders, transponders one through nine may be assigned to priority

12 level one, transponders ten through fourteen priority level two, and transponders fifteen through

13 eighteen assigned to priority level three. Thus, a concatenated cable system 210 capable of

14 operating only at priority level two, would only receive signals from transponders one through

15 nine, and ten through fourteen from the respective cable headend 208. The program signal

16 from transponders fifteen through eighteen would not be transmitted to the priority level two

17 concatenated cable system. This method requires the Operations Center 202 to properly

18 assign programs to transponders by priority level. This can be accomplished by the CAP using

19 the software described earlier (e.g., Figure 8 at 438 and 440).

20   The third and the preferred method is for the cable headend 208 to pick and choose

21 programming from each transponder and create a customized priority one, two, and three signal

22 with chosen television programming. The cable headend 208 would then route the appropriate

23 customized signal to each part of the concatenated cable system 210 that the cable headend

24 208 serves. This third method requires that the cable headend 208 have a component, such

25 as the combiner (described in greater detail in U.S. Patent Application Serial Number

26 08/160,283, filed December 2, 1993, entitled DIGITAL CABLE HEADEND FOR A

27 CABLE TELEVISION DELIVERY SYSTEM, now U.S. Patent No. 5,682,195, which can

1 select among programs prior to combining the signal for further transmission on a concatenated

2 cable system 210. The third method requires the least coordination between Operations

3 Center 202 and the cable headend 208.

4 In addition to dividing the television programming and menus into parts, the Operations

5 Center 202 of the preferred embodiment is also capable of dynamically changing the bandwidth

6 allocation for a particular category of programming. Figure 18 depicts this dynamic change in

7 bandwidth allocation from a typical week day prime time signal 250 to a Saturday afternoon

8 in October signal 252 (during the college football season). Figure 18 highlights the fact that the

9 bandwidth allocated to sports is limited to eight selections 251 during week day prime time 250

10 but is increased to sixteen selections 253 during a Saturday afternoon in October 252. This

11 dynamic increase in bandwidth allocation allows the system to accommodate changes in

12 programming occurring on an hourly, daily, weekly, monthly, seasonal and annual basis.

13 In addition to dynamically allocating bandwidth for programming categories, the

14 Operations Center 202 can also dynamically change the menu capacities in order to

15 accommodate the change in programming and bandwidth. For example, on a Saturday

16 afternoon in October 252, the major menu for sports may include a separate subcategory for

17 college football. This subcategory would, in turn, have a separate submenu with a listing of

18 four, six, eight, or more college football games available for viewing. In order to accommodate

19 this dynamic menu change, the Operations Center 202 must add a submenu listing to the major

20 sports menu, create a new or temporary submenu for college football, and allocate the

21 necessary menu space on the college football submenu.

22 Once the television programs have been packaged and a program control information

23 signal is generated to describe the various categories and programs available, the packaged

24 programs are then digitized, compressed, and combined with the program control information

25 signal. Upon the signal's departure from the Operations Center 202 the breakdown

26 into categories is insignificant and the signal is treated like any other digitally compressed

27 signal

1   G.   Compressing and Transmitting Program Signals

2   After packaging, the packaged television program signal is prepared for satellite

3   transmission and sent from the Operations Center 202 to the cable headend 208 via satellite

4   206. Depending on the specific embodiment, the television program signal may need to be

5   compressed, combined/multiplexed, encoded, mapped, modulated, upconverted and amplified.

6   This system, which is intended to be compatible with existing C and Ku Band satellite

7   transmission technologies, accepts video, audio and data signals ranging in signal quality, and

8   input from a number of sources.

9   As shown in Figure 3, in the preferred embodiment, the packaged program signal will

10   be treated at a master control uplink site 211 prior to being transmitted to the satellite 206.

11   Following compression the channels must be multiplexed for each transponder carrier and sent

12   to the satellite 206 dish that will provide the uplink. A variety of multiplexing schemes may be

13   used in the system. In some situations, it may be advantageous to use different multiplexing

14   schemes in different parts of the overall system. In other words, one multiplexing scheme may

15   be used for satellite transmission 206 and a second remultiplexing scheme for the land

16   transmission. Various satellite multi-accessing schemes and architectures can be used with the

17   system, including both single channel per carrier (SCPC) frequency division multiplex (FDM)

18   and multiple channel per carrier (MCPC) time division multiplexing (TDM). Time division

19   multiplexing is the more desirable scheme.

20   Once the signal has arrived at the uplink or master control site 211, it must be

21   modulated, upconverted, and amplified. Various types of satellites and transponders capable

22   of handling digital signals may be used in this cable television packaging and delivery system.

23   One of the achievements of the present invention is effective utilization of digital compression

24   technology by packaging television programs into categories that allow easy access to television

25   programs by consumers. With current digital compression techniques for video, the typical

26   50-channel capacity cable satellite receiving system can be increased to 300 channels.

1   Presently, one transponder is used for each satellite delivered channel. The preferred

2   embodiment uses 18 satellite transponders and compression ratios of 4:1 to 8:1 to achieve a

3   capacity of 136 satellite delivered channels. More transponders or higher compression ratios

4   can be used to deliver up to the channel capacity of any existing cable system.

5   An example of a satellite that may be used is the AT&T Telstar 303. The signal is

6   transmitted from the satellite 206 to the cable headend 208 where a computer system including

7   a digital switch treats the signal and delivers it through cables to a subscriber's home. In

8   alternate embodiments, multiple Operations Center 202 and multiple uplink sites 211 can be

9   simultaneously utilized.

10   H.   Cable System Use of Control Signal

11   Figures 19 through 21 depict sample menu screens produced by the set top terminal

12   220 using the program control information signal 276. Figure 19 shows a menu which enables

13   the viewer to select a program category or program service from among a choice of eight

14   program categories. Figure 20 shows a menu for the viewer to select a hit movie from among

15   ten hit movies. Figure 21 provides information about a movie (or event) and enables a viewer

16   to order the movie for viewing.

17   Figure 19 through 21 show text generation by the set top terminal 220. This text is

18   generated using information received via the program control information signal. Figure 20

19   shows the text 380 generated for the hit movies major menu. In the preferred embodiment, text

20   380 such as that shown in Figures 19 through 21 is generated separately by a text generator

21   (not shown) in the set top terminal unit 220. Those portions of the text that generally remain

22   unchanged for a period of weeks or months may be stored in EEPROM or other local storage.

23   For example, the text "HIT MOVIES from" 382 will consistently appear on each hit movies'

24   major menu. This text may be stored on EEPROM or other local storage. Further, text such

25   as that which appears at the lower center part of the screen "PRESS HERE TO RETURN TO

26   CABLE TV" 384 appears many times throughout the menu sequence. This text may also be

27   stored locally at the set top terminal 220. Text which changes on a regular basis, such as the

1   movie titles (or other program selections), will be transmitted to the set top terminal 220 by

2   either the operations center 202 or the cable headend 208. In this manner, the cable headend

3   208 may change the program selections available on any major menu modifying the program

4   control information signal sent by the operations center 202 and transmitting the change. The

5   network controller 214 of the cable headend 208 generally modifies the program control

6   information signal and transmits the set top terminal control information signal (STTCIS). It is

7   preferred that the text 380 is generated by the set top terminal 220 separately from the graphics

8   because the text can be stored locally in a more compact manner requiring less storage space

9   at the set top terminal 220. In addition, it allows for easy communication of text changes from

10   the operations center 202 or cable headend 208 to the set top terminal 220.

11   Figures 19 through 21 show the use of day, date and time 386 information on menus.

12   This information may be obtained in a variety of ways. The day, date, and time information 386

13   may be sent from the operations center 202, the cable headend 208 (signal processor or

14   network controller 214), the uplink site, or generated by the set top terminal unit 220 internally.

15   Each manner of generating the day, date, and time information 386 has advantages and

16   disadvantages which may change given the particular embodiment and costs. In the preferred

17   embodiment, the day, date, and time 386 are generated at a central location such as the

18   operations center 202 and are adjusted for regional changes in time at the cable headend 208.

19   In order for the set top terminal 220 to generate submenus for subcategories of

20   categories shown in Figure 19 (which relate to the content of the programs), and to generate

21   menus for movies such as Figure 21, the terminal must receive information on the content of the

22   programs from the Operations Center 202 (via the cable headend 208). Normally the set top

23   terminal 220 would receive this information in the form of the program control information signal

24   (or STTCIS). As shown figure 21, in addition to the text needed for these program menus,

25   video or program scenes are also necessary.

26   Live video signals may be used in windows of certain menus such as Figure 21. These

27   video signals can be sent via the program control information signal, STTCIS, or can be taken

1   off channels being transmitted simultaneously with the menu display. If the video signal is taken

2   off a channel, less information needs to be sent via the program control information signal.

3   However, this technique requires that separate decompression hardware be used for the

4   program control information and the channel carrying the video. Separate decompressors for

5   the video signals and program information signal allows for the greatest flexibility in the system

6   and is therefore the preferred embodiment. A separate decompressor also assists in assuring

7   that the switch from menus to television programming is smooth and without any significant time

8   delay.

9   Live video for menus, promos or demos may be sent to the set top terminal 220 in

10   several ways: a) on a dedicated channel, b) on a regular program channel and scaled to size,

11   c) sent along with the program control information signal, etc. However, in the preferred

12   embodiment, a great deal of short promos or demo video are sent using a split screen technique

13   on a dedicated channel.

14   Using a split screen technique, any number of different video clips may be sent (e.g.,

15   2, 4, 6, or 8 video clips). To show the video clip on a menu, the video must either be scaled

16   and redirected to a video window on a menu screen or a masking methodology can be used.

17   Masking involves playing the entire channel of video (all 2, 4, 6, or 8 split screens) in

18   background and masking the unwanted video clip portions of the split screen by playing the

19   menu in foreground and overlaying the unwanted background video. Masking is the least

20   expensive method because it does not require any special hardware and it increases video

21   throughput to the set top terminal 220. However, using the masking technique without any

22   video redirecting causes each video clip to be located in a different position on the screen. It

23   also requires the masking to be different for each video clip and makes consistent format

24   difficult. On the other hand, scaling and redirecting video is generally difficult, expensive and

25   requires additional hardware.

26   In order for the Operations Center 202 to prepare the promo video signal to be sent

27   to the set top terminal 220, the Operations Center 202 must first identify the duration and actual

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1   video cut to be used for each promo and its position within the promo video signal. This

2   information is maintained within the Operations Center 202 database. When it is time to

3   produce the promo video signal (either to tape or to broadcast), each promo cut is scaled,

4   positioned and combined with the other promos to form the single promo video signal. This

5   is performed by readily available commercial equipment. Each promo is run repeatedly while

6   the promo video signal is being generated. The audio signals of the individual promo cuts may

7   be combined into the promo video signal audio tracks based upon the number of audio tracks

8   available. The mapping of the audio tracks to the promos is also stored in the Operations

9   Center database. Additionally, the mapping of promos to the programs that they are

10   previewing is also stored in the Operations Center database. All promo database data is made

11   available to the set top terminal 220 through the STTCIS.

12   In the preferred embodiment, the Operations Center 202 transmits six video/graphic

13   promos for advertising purposes all on one channel. The throughput of the video/graphics on

14   a single channel can be increased through the use of digital compression techniques. The set

15   top terminal 220 uses either video scaling and redirecting techniques or masking to utilize the

16   six video scenes. Although the set top terminal 220 actually performs the manipulation of video

17   as necessary to generate the "live" menus for the subscriber, the appropriately prepared

18   video signals must be formed and sent by the Operations Center 202 to the set top terminal

19   220.

20   If a promo for a given program is available at the set top terminal 220, the viewer may

21   command the set top terminal 220 to display the promo. Generally, this is done through

22   program selection from a menu screen by the subscriber. The selected program is referenced

23   to information about available promos and allows the set top terminal 220 to tune to the proper

24   channel, select the appropriate menu overlay mask based on the promos position and switch

25   on the audio track(s) if they are available. The promos position on the screen dictates the

26   displaying of the "live" text (refer to the video window of Figure 21). The program associated

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1   with the currently selected promo may be purchased from this menu screen. Events, services

2   and slices of time may be purchased from promotional menus.

3   Management of promo video signals at the Operations Center 202 is similar to that of

4   other programs except that more information is needed in order to specify the details of the

5   promo video signal. The broadcasting of the promo video signal is identical to the broadcasting

6   of a video program.

7   In order to limit the amount of bandwidth needed to transmit the program control

8   information signal, various compression techniques employed for non-video may be used such

9   as block coding, contour coding, blob encoding, and run-length encoding. Further, the

10   program control information signal may be divided into text and graphics, or video, text and

11   graphics and then recombined at the set top terminal 220 using a text generator, graphics

12   decompression, and video decompression as necessary.

13   As shown in Figure 2, an analog cable TV system 205 can continue to exist alongside

14   and within the digitally compressed system of the present invention. The digital transmissions

15   do not effect the analog system. In fact, the analog cable signal may be transmitted

16   simultaneously on the same cable as the digital signal. Cable headends 208 may continue to

17   supply subscribers with local channels in an analog signal format.

18   In the preferred embodiment, the Operations Center 202 and uplink 204 (Figure 1)

19   or master control site 211 (Figure 3) are collocated. However, the Operations Center 202 and

20   uplink site 204 may be located in different geographical places. Also, functions and equipment

21   within the Operations Center 202 may be remotely located. For instance, the program storage

22   may be at a different site and the programs may be sent to the CAP 260 via landline.

23   Alternate embodiments of the system 200 of the present invention may use multiple

24   Operations Centers described above. In such an embodiment, it is preferred that one

25   Operations Center be designated the Master Operations Center and all other Operations

26   Centers be Slave Operations Centers. The Master Operations Center performs the functions

27   of managing and coordinating the Slave Operations Centers. Depending on the method in

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1   which the Slave Operations Centers share functions, the Master Operations Center

2   coordination function may involve synchronization of simultaneous transmissions from multiple

3   Slave Operations Centers. To perform its functions, the Master Operations Center may

4   include a system clock for synchronization.

5   An efficient method of dividing tasks among multiple Operations Centers is to assign

6   specific satellite transponders to each Operations Center 202 and to assign external program

7   sources to the nearest Operations Center 202. Of course, this division of resources may not

8   always be possible. Since programming will be grouped into priority levels with each priority

9   level likely to be assigned specific satellite transponders, it is also possible to assign each

10   Operations Center 202 to a priority level. For example, in a three priority level system with

11   two Slave Operations Centers A and B and 18 transponders, the Master Operations Center

12   may be assigned priority level 1 and assigned 9 transponders. Slave Operations Center A may

13   be assigned priority level 2 and 5 transponders, while Slave Operations Center B is assigned

14   priority level 3 and 4 transponders. In a multiple Operations Center configuration dynamic

15   bandwidth allocation and dynamic menu capacity allocation becomes more complex and will

16   be coordinated by the Master Operations Center.

17   Just as in the alternate embodiment wherein multiple Operations Centers 202 are used,

18   a delivery system may have multiple satellite uplinks. Preferably, each Operations Center 202

19   has one or more uplink sites. Each Operations Center 202 controls the functions of its assigned

20   uplink sites and may assign one site as a master uplink site.

21   In another alternative configuration, in regions or areas without cable services, where

22   subscribers might use backyard satellite systems (TV RO) to receive packaged television

23   services, the set top terminal 220 will include the appropriate hardware to allow connection to

24   the backyard satellite reception equipment, i.e., a typical communication port. In this

25   configuration, the backyard satellite system will receive programming signals originating from

26   the Operations Center 202 directly from the satellite transponders. No cable headend 208 is

27   utilized with a backyard satellite system. The menu system within the set top terminal 220 will

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1   be programmed directly from the Operations Center 202. The Operations Center program

2   signals and control signals arrive at the set top terminal 220 essentially unchanged. Additionally,

3   in this configuration, an upstream communication mechanism (e.g., modem) must be in place

4   at the subscriber's home to communicate information to the Operations Center 202 such as

5   program ordering information. The set top terminals 220 can be equipped with a modem port

6   for this upstream communication to the Operations Center 202. The two alternative

7   embodiments described in the preceding four paragraphs, and other such embodiments not

8   specifically referred to herein but within the understanding of those skilled in the art, incorporate

9   or combine one or more of the components of the system 200 of the present invention.

10   Although the present invention has been shown and described with respect to preferred

11   embodiments, various changes and modification that are obvious to a person skilled in the art

12   to which the invention pertains are deemed to lie within the spirit and scope of the invention as

13   defined by the following claims.

1 **CLAIMS**

2 What is claimed is:

3 1. An apparatus for packaging programs in a television program delivery system,

4 comprising:

5 a central processor unit (CPU), the CPU comprising program instructions for

6 packaging programs for delivery using the television program delivery system;

7 a program storage database coupled to the CPU, wherein the programs are stored for

8 packaging;

9 a viewer information database coupled to the CPU, wherein viewer information is

10 stored;

11 an external program source coupled to the CPU, wherein external programs are

12 received at the apparatus; and

13 a delivery control processor unit (DCPU) coupled to the CPU, wherein a program

14 control information signal is generated.

15 2. The apparatus of claim 1, wherein the CPU further comprises:

16 a packager data entry interface, comprising:

17 a program selection module used to interactively select programs for delivery;

18 a program start time module used to select program start times;

19 a price setting module used to set program prices;

20 a transponder allocation module used to allocate transponder space; and

21 a menu editing module used to construct a program menu.

22 3. The apparatus of claim 1, wherein the CPU further comprises:

23 a marketing information interface, comprising:

24 a programs watched information module that receives programs

25 watched information for terminals in the television program delivery system;

1   a marketing information module that receives marketing information

2   including viewer demographic information; and

3   an algorithms module that analyzes the programs watched information and the

4   marketing information.

5   4.   The apparatus of claim 3, wherein the marketing information interface comprises a yield

6   management subsystem, wherein the yield management subsystem determines an optimum time

7   to broadcast a specific program in the television program delivery system.

8   5.   The apparatus of claim 4, wherein the optimum time is based on maximizing expected

9   programs watched data for the specific program.

10   6.   The apparatus of claim 4, wherein the optimum time is based on maximizing viewer buy

11   rates for the specific program.

12   7.   The apparatus of claim 4, wherein the yield management system further determines an

13   optimum mix of programs for delivery on the television program delivery system, and wherein

14   the optimum mix of programs is based on one or more of program substitutes, program

15   complements, time slice positioning, program repetitions, transponder availability, and menu

16   positioning.

17   8.   The apparatus of claim 1, wherein the television program delivery system includes a

18   cable television system, and further comprising a cable franchise information access module

19   (CFIA), the CFIA, comprising:

20   a headend information module that analyzes information related to one or more

21   specific cable headends, the information including one of a number of terminals connected to

1 the cable headend, grouping of terminals, terminal configurations, and cable headend

2 equipment; and

3 a cable franchise control signal generator that generates cable headend specific

4 information, wherein the cable headend specific information is integrated with the program

5 control information signal.

6 9. The apparatus of claim 1, further comprising:

7 a process menu configurations module that determines menu formats and positions

8 programs on menu screens;

9 a menu display module that provides a menu display; and

10 a menu edit module that provides on-the-fly menu editing.

11 10. The apparatus of claim 1, further comprising:

12 a graphical transponder allocation display module that shows transponder allocation

13 across the television program delivery system;

14 an editing transponder allocation module that provides interactive reallocation of

15 transponder space; and

16 a video packaging module that packages the program control information signal and

17 the programs.

18 11. The apparatus of claim 1, further comprising:

19 a process program line-up module that develops a program lineup, wherein

20 importance weighting algorithms and best fit time algorithms are used to assign programs to time

21 slots.

22 12. The apparatus of claim 11, wherein the process program line-up module,

23 comprises:

1   a source creation module that processes source materials, wherein the source materials

2   include materials from internal sources and external sources, and wherein the source material

3   includes one or more of audio, video, text and multimedia material;

4   a program creation module that creates programs based on the processed source

5   materials;

6   an event creation module that creates events comprising one or more programs;

7   a service creation module, wherein a service includes one or more events, the service

8   creation module assigning run times and dates for each service, and checking for conflicts; and

9   a menu creation module that adds event and service information to a menu.

10   13.   The apparatus of claim 1, wherein the programs comprise one or more of television

11   programs, advertisements, promotionals, infomercials, interactive programs, and Internet access

12   programs.

13   14.   A method for packaging programs for delivery to one or more terminals in a network,

14   comprising:

15   collecting user information for one or more users in the network;

16   receiving program information related to available programs;

17   determining a program lineup based on the collected user information and the program

18   information; and

19   providing the program lineup to one or more of the terminals.

20   15.   The method of claim 14, further comprising broadcasting the programs to the terminals

21   in the network, the broadcast arranged according to the program lineup.

22   16.   The method of claim 14, wherein the determined program lineup is a unique program

23   lineup determined for each terminal in the network, further comprising:

1   receiving a program selection from a user, the program selection based on the unique

2   program lineup; and

3   providing the selected program to the user.

4   17.   The method of claim 14, wherein the determined program lineup is a one of a plurality

5   of group program lineups, each of the group program lineups determined based on information

6   for a group of users, further comprising broadcasting programs to the terminals in the network,

7   the programs arranged according to one or more of the plurality of group program lineups.

8   18.   The method of claim 17, wherein a group of users are serviced by a cable television

9   headend.

10   19.   The method of claim 14, wherein each of the plurality of group program lineups and

11   the broadcast programs are provided in a separate program channel.

12   20.   The method of claim 14, wherein the user information comprises:

13   programs watched information;

14   user demographic information; and

15   user-provided data.

16   21.   The method of claim 20, wherein the programs watched data comprises:

17   programs purchased information;

18   program viewing times; and

19   channel tuning information.

20   22.   The method of claim 20, further comprising:

21   analyzing the user information to determine an optimum program lineup; and

1   packaging programs for broadcast according to the optimum program lineup.

2   23.   The method of claim 14, wherein the program lineup comprises a program control

3   information signal, the program control information signal, comprising:

4   program category information, including names of program categories;

5   channels assigned to program categories;

6   programs available on each of the channels;

7   program start/stop time and duration;

8   program description; and

9   sample video clips for advertisement of a program.

10   24.   The method of claim 21, further comprising generating a program menu based on the

11   program control information signal, wherein the subscriber selects a program for viewing based

12   on the program lineup shown in the program menu.

13   25.   The method of claim 14, wherein the program lineup includes local avails, wherein local

14   program sites insert local programs in the local avails.

15   26.   The method of claim 14, wherein the program lineup and the programs are provided

16   directly to the terminals.

17   27.   The method of claim 26, wherein the program lineup and the programs are provided

18   over a satellite distribution system.

19   28.   The method of claim 27, wherein the satellite distribution system is a C band system.

20   29.   The method of claim 27, wherein the satellite distribution system is a Ku band system.

1   30.   The method of claim 26, wherein the program lineup and the programs are provided

2   over the Internet.

3   31.   The method of claim 26, wherein the program lineup and the programs are provided

4   over a cable television system.

5   32.   The method of claim 26, wherein the program lineup and the programs are provided

6   using over-the-air broadcast.

7   33.   The method of claim 26, wherein the program lineup is provided using a first

8   communications device and the programs are provided using a second communications

9   device.

10   34.   The method of claim 33, wherein the first communications means is a dedicated

11   channel.

12   35.   The method of claim 33, further comprising:

13   providing menu format information to the terminals, wherein the terminals use the

14   program control information signal and the menu format information to generate an original

15   program menu for display at the terminal; and

16   providing revised menu format information to the terminals, wherein the revised menu

17   format information is used to generate a program menu having a format different from the

18   original program menu.

19   36.   The method of claim 14, wherein the programs comprise:

20   interactive services;

21   subscription services; and

1   data services.

2   37.   The method of claim 36, wherein the data services comprise connection to an Internet

3   Service Provider.

4   38.   The method of claim 36, wherein the data services comprise electronic commerce

5   services including online services for reservation of airline seats.

6   39.   The method of claim 36, wherein the subscription services are based on a calendar

7   period.

8   40.   The method of claim 36, wherein the interactive services include educational programs

9   and games.

10   41.   The method of claim 14, further comprising optimizing the program lineup, the

11   optimization, comprising:

12   receiving marketing information related to the available programs;

13   determining a program importance for each of the available programs;

14   assigning a weighting factor to each of the available programs; and

15   positioning each of the available programs within the program lineup.

16   42.   The method of claim 41, further comprising:

17   computing a yield management value for the program lineup, wherein the programs are

18   positioned in the program lineup to maximize the yield management value.

19   43.   The method of claim 41, further comprising:

1   computing a yield management value for one of the available programs, wherein the one

2   available program is positioned in the program lineup to maximize the yield management value.

3   44.   The method of claim 43, wherein the marketing information comprises program profit

4   value and program viewed information.

5   45.   A system for packaging and delivering programs to remote terminals, comprising:

6   a master operations center, comprising:

7   a central processor unit (CPU), the CPU comprising program instructions for

8   packaging programs for delivery to terminals coupled to the television program delivery

9   system, and

10   a program storage database coupled to the CPU, wherein the programs are

11   stored for packaging; and

12   one or more slave operations centers operably connected to the master operations

13   center, each of the one or more slave operations centers, comprising:

14   a local CPU,

15   a viewer information database coupled to the local CPU, wherein viewer

16   information is stored,

17   an external program source coupled to the local CPU, wherein external

18   programs are received,

19   a delivery control processor unit (DCPU) coupled to the local CPU, wherein

20   a program control information signal is generated, and

21   one or more uplink sites for transmitting the program control information signal

22   and the programs to the remote terminals.

23   46.   The system of claim 45, wherein the master operations center, comprises:

1   a synchronization module that controls transmissions from the one or more slave

2   operations centers, the synchronization module including a system clock; and

3   a transponder assignment module that assigns specific transponder space to each of

4   the one or more slave operations centers.

5   47.   The system of claim 45, wherein the remote terminals include cable television

6   headends.

7   48.   The system of claim 45, wherein the remote terminals include television

8   terminals.

9   49.   A method for optimizing program packaging in a program delivery system, comprising:

10   selecting one or more programs for packaging;

11   determining program start times and dates;

12   allocating transponder space;

13   setting program prices;

14   generating a program menu;

15   generating a program control information signal;

16   packaging the programs and the program control information signal; and

17   transmitting the packaged programs and the program control information signal.

18   50.   The method of claim 49, further comprising:

19   selecting types of program for packaging; and

20   adding additional program elements.

1   51.   The method of claim 49, wherein the program types include static programs, interactive

2   programs, pay per view programs, live event programs, data services, and subscription

3   programs.

4   52.   The method of claim 51, wherein the data services include connection to an Internet

5   Service Provider.

6   53.   The method of claim 49, further comprising:

7   generating cable franchise information; and

8   combining the cable franchise information with the program control information signal

9   and the programming package.

10   54.   A method for packaging programs for delivery over a television program delivery

11   network, comprising:

12   developing a program schedule and a program menu;

13   identifying time slots for local avails;

14   editing the program schedule and the program menu;

15   identifying external programs, comprising:

16   gathering programs from external sources, and

17   converting the external programs to a standard format;

18   identifying internal programs, comprising:

19   accessing stored programs, and

20   converting the stored programs to the standard format;

21   identifying live programs, comprising signaling needed live program signal feeds;

22   combining the external programs, the internal programs and the live programs;

23   and

24   generating a program control information signal based on the combined programs.

1   55.   The system of claim 54, further comprising:

2   obtaining franchise information; and

3   using the franchise information and the combined programs to generate the program

4   control information signal.

ABSTRACT

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2   An apparatus and a method provide optimum packaging of programs for delivery over

3   a television program delivery system. The apparatus includes a central processor unit (CPU)

4   that is used to select program categories and identify external and internal programs. For

5   packaging. The CPU includes advanced features to weight programs according to established

6   criteria including previous buying history, programs watched data, and viewer demographics.

7   The CPU formats a menu having a program lineup and assigns transponder space. Other

8   advanced features include the use of multiple operations centers to support the packaging,

9   delivery of the packaged programs to cable television headends, insertion of local avails, and

10   direct transmission of program packages to individual television terminals.